Handbook of Research on

Updating and Innovating Health Professions Education

Post-Pandemic Perspectives

Channing Rodriguez Ford and Kimberly B. Garza

IGI Global
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Handbook of Research on Updating and Innovating Health Professions Education:

Post-Pandemic Perspectives

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psychology, social work, and law, but could easily be expanded to include learners from other disciplines. The authors include descriptions of the process of implementing the unfolding case series in both face-to-face and live remote settings. This will include a sample case vignette, a pre-/post-survey, and learning objectives. Finally, the authors include opportunities for expansion and discussion of the challenges of implementing a curriculum targeted toward learners from diverse disciplines.

This chapter focuses on promoting student engagement in heath profession education. Discussions will include the longstanding issues related to student engagement that were evident before the COVID-19 pandemic, how these issues associated with engagement were magnified during the pandemic, and how these issues have been transformed into new opportunities to enhance student engagement as we collectively enter the post-pandemic era. Elements of wellbeing, resiliency, and motivation, as they relate to engagement, are explored in depth. Strategies to promote student engagement in the future classroom are discussed in addition to considerations for stronger faculty engagement surrounding teaching. Throughout the chapter, the experiences of one school of pharmacy will be described, providing examples of strategies for enhancing engagement in the post-pandemic classroom.

This chapter will explore the connection between diversifying health profession student demographics, diversifying challenges these students face, and the new obstacles presented by shifting curriculum delivery to remote and hybrid learning during the coronavirus disease 2019 (COVID-19) pandemic. The chapter will explore challenges that may seem especially difficult to address in a remote learning model: the desire to develop community among fellow learners when in a hybrid or fully remote program and when learners are from varied backgrounds; cultivating in students coping mechanisms to manage anxiety from the economic uncertainty of today's world, balancing commitments between educational pursuits and other responsibilities (e.g., child or parent care, etc.); and facilitating learning for students with physical and/or mental disabilities or chronic medical conditions.

The COVID-19 pandemic brought unprecedented challenges to higher education. The extraordinary challenges created by the pandemic required equally extraordinary efforts from faculty and other stakeholders to rapidly convert face-to-face classes to online/hybrid instruction. This rapid change was facilitated by use of a robust framework for not only making changes in short order but also sustaining the changes to reshape healthcare education for a post-pandemic future. To this end, the chapter discusses the effective use of Kotter's 8-step framework to successfully implement change in healthcare education at a college of pharmacy and allied health professions. This chapter discusses each step of Kotter's 8-step process to create, implement, and sustain change in pharmacy and allied health education. The model integrated people, processes, and effective strategies to create changes amid the pandemic (crisis). Lessons learned and implications for the future in a post-pandemic educational environment are presented.

The purpose of the chapter is to illustrate instructional models that were implemented by Samford University McWhorter School of Pharmacy to comply with COVID-19 social distancing restrictions. While the second half of Spring 2020 was completely online (statewide shutdown), the university remained open in a hybrid manner for the 2020-21 academic year. There are three sections in the chapter: didactic, interprofessional, and advanced pharmacy practice experiences. The didactic section discusses course delivery methods and active learning, office hours, remote testing, student feedback, and contingency planning. The interprofessional section illustrates some of the school's synchronous and asynchronous interprofessional learning activities before and during the COVID-pandemic, as well as interprofessional education assessment methods. The last section of the chapter discusses how advanced pharmacy practice experience "direct patient care" was redefined, examples of the experiences, and contingency plans that were put into place to ensure on-time graduation for the classes of 2020 and 2021 pharmacy students.

This chapter focuses on the implementation of performance-based assessments (PBAs) at the Auburn University Harrison School of Pharmacy (AUHSOP) during the COVID-19 pandemic, when shifts were made to a fully remote delivery of the pharmacy curriculum in March 2020 and then altered to a hybrid

Foreword

My professional pathway started in pharmacy education almost 20 years ago. Since that time, I have had the privilege of leading interprofessional education initiatives with a team of true champions, taught in nursing and biomedical sciences graduate programs, and have recently transitioned to faculty development in osteopathic medical education. In each of these settings, I have witnessed the extraordinary impact that excellence in teaching has on our health professions' students. Armed with a toolbox of approaches and technological advances, we have become adept at teaching clinical skills, creating contextualized learning experiences, and enhancing student engagement across our curricula. We have learned to be intentional in creating opportunities for development of professional identity while supporting our students as they integrate as members of interprofessional healthcare teams. Our assessment practices align with our teaching and target the knowledge, skills, and attitudes integral to our professions. In March 2020, all of this was put to the test.

Since starting as a faculty member in pharmacy education in the early 2000s, I have seen few challenges to health professions' education that surpass the sudden and jarring impact of the COVID-19 pandemic. Though previous initiatives have called for urgent transformations in the way we teach our students, each challenge arrived with clear descriptions of the need and a vision for creating the change. There were opportunities to evaluate the data, make evidence-based decisions, and create consensus among professional organizations and experts in our fields. Conversely, the 2020 pandemic produced the urgency without the luxury of the planning, precedence, or support needed to ensure effective change. Educational shifts were made on a moment's notice at a time when the healthcare field was facing its own upheaval.

Handbook of Research on Updating and Innovating Health Professions Education: Post-Pandemic Perspectives provides a series of examples and perspectives describing how COVID-19 impacted the education of our future health professionals. I am inspired by the demonstration of innovation and successes and reminded to take a moment to reorient to our goals before moving forward. Throughout this text, we find educators who continued to seek excellence in health professions' education despite the inherent challenges in technology and lack of traditional resources. We also glean from our authors that the COVID-19 pandemic has permanently changed the landscape of health professions' education. The transition from pre-pandemic to post-pandemic education was fractured, hectic, and often based on survival instincts. It is critical that educators begin to step out of the immediacy of the initial educational changes to plan for deliberate and effective approaches to meet the needs of our future. We cannot look to return to our prior normal but must instead embrace the new normal that has arisen from this experience.

We must also recognize that there are new challenges that will arise from our experiences. Demonstrated successes in virtual teaching environments have changed our students' expectations of a classroom but left us with inequities not previously anticipated in the physical classroom. Educators must remain open to the concept of the hybridized classroom where virtual learning is part of the working norm but seek to find ways to bridge the gaps that exist based on social and economic diversity. We must consider how we will ensure professionalization, teach and assess clinical skills, and enhance interpersonal and team skills when our students are in virtual environments. The engagement of our students in their professional education is also at stake and will require the same deliberate attention used to craft our prior curricula. Mental health of our students and faculty members continues to be a significant concern. Many have lost loved ones and have gained very different perspectives on their roles as healthcare providers. The risk associated with our chosen professions has never been more apparent.

Readers will find that the authors included within this text have created a rich resource that showcases how faculty have risen to the challenge of a virtual classroom. In addition, readers will have the opportunity to reflect on the future and how to apply what they have learned throughout this unprecedented experience. They will find models for creating educational excellence and opportunities to adapt their own approaches to better meet the needs of their students. This is a book that should be read by any faculty member passionate about the current and future state of health professions' education.

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Preface

"The COVID-19 pandemic brought unprecedented challenges to higher education. The extraordinary challenges created by the pandemic required equally extraordinary efforts from faculty and other stakeholders to rapidly convert face-to-face classes to online/hybrid instruction." – Seefeldt et al.

In the best of times, the creation, implementation, and evaluation of health professions education is challenging. As health professions educators are tasked with developing the next generation of healthcare providers, curriculum development and refinement is a never-ending cycle due to the evolving nature of healthcare (Kerr et al., 2020). Gone are the days of rote memorization and multiple-choice exams as the sole measure of student learning. To ensure that our learners are prepared to hit the ground running upon entering professional practice, health professions faculty must be innovative to ensure that graduates have the knowledge, skills, and abilities to practice independently.

Prior to the COVID-19 pandemic, health professions education had been making changes globally, pushing academic programs to consider interprofessional collaboration/practice, encouraging students to think and act as change agents, and so forth (Kerr et al., 2020). Clinical skills development and evaluation was being integrated, attention was being paid to the development of students' professional identity (Kinnear et al., 2021), and the role of advocacy within the profession and for patients was being emphasized (Water et al., 2016). Students were being encouraged to consider their role not only with patients, but also within the healthcare team as well as the overall healthcare system (Soubra et al., 2018).

THE CHALLENGES

In 2020, the impact of COVID-19 proposed yet another challenge for faculty and preceptors within the health professions, the elimination of face-to-face teaching opportunities, clinical placements, and traditional assessment approaches (Rashid & Yadav, 2020). Health professions educators were now charged with taking established curriculums and either modifying or throwing out carefully devised learning experiences. Classrooms became virtual classrooms, clinical skills assessments conducted in a skills lab became virtual simulations completed at home, in isolation, or were removed all together. Faculty no longer had the option of making curricular changes based on carefully crafted research or student feedback, instead they had to identify accessible technology for both themselves and students to ensure that learning could continue. Faculty were also charged with not only creating new learning opportunities but, in many cases, had to learn how to utilize the technology themselves and be prepared to assist students during this transition as well (Ali, 2020; Rashid & Yadav, 2020).

While faculty struggled with these new challenges, students also suffered. Early research shows that students lost a sense of community both with their classmates and with their instructors that has continued to be exacerbated by social distancing restrictions and isolation (Conrad et al., 2021; Liu et al, 2020). Further, early research found increased reports by the general public of psychological distress, moderate-to-severe depression, and anxiety (Grubic et al., 2020; Wang et al., 2020). While research in this area is still limited in college students, a similar trend within this population might be expected. The impact on students during the relocation process has shown that students experience stress and anxiety within normal circumstances (Conrad et al., 2021; Reyes-Rodriguez et al., 2013). This upheaval during the pandemic emulates all the required elements of a disaster situation which has been found to increase depression and anxiety (Conrad et al., 2021; Liu et al, 2020; Uscher-Pines, 2009). Conrad et al. (2021, 119) notes that "Sudden relocation following a potentially traumatic experience can create psychological stress and limit access to resources needed for coping and recovery".

Work/life balance was disrupted for faculty and students alike. For educators, the delineation between work and home became troublesome as mandates for remote working and quarantine were put into place. For students, the financial ramifications of staying within university communities were too great, resulting in many students returning to their parental dwellings to alleviate costs and to increase access to technology. While this may have provided students with additional support, many found it challenging to return home and remain engaged with their scholarly pursuits. At the same time, students who remained on campus may have had multiple roommates, with varying class schedules, which posed challenges such as limited internet strength, identifying quiet spaces to study or complete assessments, and minimizing distractions.

The ramifications of the pandemic also resulted in delayed progression for students conducting research both in the lab and in the field (Rashid & Yadav, 2020). Lockdown mandates and quarantine guidelines resulted in students being removed from their fields of study, often resulting in having to identify new areas of research or a willingness to put their academic careers on hold (Aucejo et al., 2020; Rashid & Yadav, 2020). Disruptions in student research activity could also have broader impacts on scientific progress, creating an urgent need to find workarounds and creative solutions.

SEARCHING FOR A SOLUTION

Many faculty developed creative ways to integrate content or to engage with students in the virtual environment. Utilization of technology in the learning environment had increased substantially during the pandemic, and early research is already finding that faculty will continue to utilize some of these new avenues moving forward (Tabatabai, 2020b). Primary examples of this are utilizing telehealth, virtual reality, and simulation technology in clinical rotations and clinical skills development (Tabatabai, 2020a). In some cases, the lockdown period in late Spring 2020, pushed academic programs to consider these alternate strategies to allow students who were months away from completing their degrees to be able to move forward and enter the workforce during a time where healthcare professionals were desperately needed (Tabatabai, 2020a).

The forced shift to remote learning, brought about change within faculty that they were hesitant to embrace prior to the Pandemic. These changes were not limited to simply classroom interactions; how faculty connected with students also changed, pushing faculty to meet with students using programs such as Zoom or Microsoft Teams, and broadening their communication platforms to text messaging or chat features.

The integration of virtual learning technology has the potential to impact health professions education long-term. With this continued integration, program recruitment could change substantially, allowing students to remain in place while receiving aspects of their educational experiences from anywhere in the world (Khalil et al., 2020). This opens the possibility for higher education to reevaluate their fiscal models to reduce expenditures on buildings and associated costs. These potential cost savings could then be shifted to improve technology offerings and could potentially better meet the evolving educational access and experience needs of current and future students.

TARGET AUDIENCE

The target audience for this book includes health professions educators, graduate educators, undergraduate educators, and administrators within institutions of higher education.

ORGANIZATION OF THE BOOK

The book encompasses 16 chapters, and a brief overview of each contribution follows:

In Chapter 1, Placide and Vance present diversity, equity, and inclusion (DEI) as areas that may have been overlooked as institutions shifted rapidly to adapt to an online learning environment. Social determinants of health and racial and ethnic disparities in health professions are also discussed. The authors explain why implementing practices to support DEI to decrease the equity gap in both healthcare and higher education is vital. An ecological lens is applied to understanding students' learning styles and how circumstances may affect learning. The authors also apply the intersectionality framework to explore inequities exacerbated by students' identities, which may cross multiple marginalized groups. Finally, they present solutions for the post-pandemic era, including commitment from leadership, engagement and flexibility, equitable experiences, and culturally responsive teaching.

In Chapter 2, McKinney et al. discuss the role of interprofessional education (IPE) as a core educational method in the health professions and compare the various IPE requirements by discipline. The chapter describes the authors' experience incorporating learners from medicine, pharmacy, psychology, social work, and law in an IPE experience drawn from de-identified patient records. The process of implementing the unfolding case series in both face-to-face and live remote settings is described, and feedback from learners in each setting is provided. Finally, the authors include discussion of the challenges of implementing a curriculum targeted toward learners from diverse disciplines and describe opportunities for expansion.

In Chapter 3, Moseley et al. present a chapter on promoting student engagement in health professions' education. The authors discuss how existing issues with student engagement were intensified during the pandemic and how these challenges may be addressed in a post-pandemic environment. Experiences from one school of pharmacy with an integrated curriculum are presented to illustrate the challenges of and adaptations to efforts to foster student engagement. The authors use wellbeing, resiliency, and motivation, core constructs of student engagement, as a framework for describing challenges and opportunities. Strategies to promote student engagement in the future classroom are discussed, including encouraging a growth mindset, improving social support, and fostering grit and resiliency.

In Chapter 4, Thomas et al. explore the connection between diverse populations of health professions students, the learning obstacles that occurred prior to COVID-19, and how the pandemic further exacerbated these challenges/obstacles when the learning environment transitioned to remote and hybrid models. The authors examine the various facets that impact students within the learning environment to include learning preferences, specifically examining the new generation of learners, Generation Z, emotional and psychosocial barriers, caregiving responsibilities, and a student's own disability. With the integration of short case-based scenarios, the authors propose potential solutions to support other health professions educators as they navigate through these challenges.

In Chapter 5, Seefeldt et al. discuss the effective use of Kotter's 8-step Framework, a model of transformational change in organizations, to successfully implement change in health professions education in response to the urgent need to accommodate pandemic restrictions in the learning environment. Each step of the process is described in detail as it relates to their efforts at a college of pharmacy and allied health professions to integrate the 3 Ps (people, programs, and processes) to create, implement, and sustain change amid the pandemic. The authors also discuss the use of the 3C framework (communicate, connect, and collaborate) to support teamwork in enacting large-scale transformational change.

In Chapter 6, Schaeffer et al. provide an in-depth analysis of one program's course model redesign to ensure continuity of instruction during the COVID-19 pandemic. This chapter describes how a school of pharmacy adapted to social distancing restrictions to develop and implement hybrid course delivery for didactic and laboratory experiences, interprofessional activities, and clinical experiences. The authors provide a robust look at the various elements that impacted planning and implementation, and strategies that were devised should additional restrictions be implemented, or faculty be unavailable.

In Chapter 7, Kleppinger et al. presents a progressive adaptation of performance-based assessments (PBAs) at one school of pharmacy, from fully in-person to fully remote delivery in March 2020 in response to pandemic restrictions, and then altered to a hybrid delivery in the fall 2020 semester in which students returned to campus in a limited capacity. The authors also describe specific challenges encountered while planning and implementing PBAs with a focus on factors related to students, standardized persons (SPs), and logistics. Data representing student and SP perceptions of remote PBA delivery modalities are presented, as well as strategies for improvement of future PBA events.

In Chapter 8, Curtis et al. present strategies for supporting baccalaureate-level nursing students as they transition from in-person clinical and classroom activities to remote learning. The authors discuss the instructional strategies they developed during the pandemic to include unfolding case studies, game-based activities, and branching scenarios, and the value of continuing these practices post-pandemic. The chapter also examines how instructors can engage with learners in the traditional classroom using non-traditional strategies, how to develop clinical skills outside of the traditional lab space, and how to safely engage students and faculty in simulation. Lastly, the authors share the challenges associated with each learning environment change and the solutions created to address those challenges to support other health professions educators as they navigate future pedagogical changes.

In Chapter 9, Mills and Winston follow with a chapter that describes the use of simulation-based education in a virtual environment to enhance students' clinical decision-making skills. Benner's five stages of clinical skills development (Novice, Advanced Beginner, Competent, Proficient, and Expert) are presented as a framework for developing and implementing appropriate simulation or scenario-based learning opportunities. The concept of problem-based learning is presented and applied to the creation of virtual unfolding patient cases as an example of low-fidelity simulation for use in a post-pandemic learning environment. The importance of feedback as a critical component of effective simulation and problem-based learning is also discussed.

In Chapter 10, Stroup et al. present faculty-driven solutions to pivot simulation experiences to a virtual platform. This chapter explores how interprofessional, in-person acute care simulations were adapted for implementation into a virtual platform, with the inclusion of knowledge checks prior to, during, and following the learning experience. The authors explore the role of interprofessional education within health professions education, sharing how they were able to adapt and execute learning experiences within a virtual/remote learning environment. Lastly, the authors share how they utilized technology to support student development while incorporating curricular elements to meet accreditation standards.

In Chapter 11, Hagle et al. describe the need for a well-trained behavioral health workforce to provide evidence-based services for patients with mental illness or substance use disorders, issues exacerbated by the COVID-19 pandemic. A rapid transition from delivering behavioral health services using traditional face-to-face encounters to the use of telehealth/telecommunication services created additional educational needs. The authors describe how training and technical assistance networks supporting these educational needs quickly moved to virtual delivery in light of the pandemic, resulting in innovations and adaptations. Four principles for effective adaptation are discussed: adapting is crucial, convening stakeholders is essential, resources (human and technological) are needed, and community involvement is integral.

In Chapter 12, Serag-Bolos et al. present options for innovative delivery methods using simulations to develop clinical skills in a virtual environment. They begin with a review of accreditation standards for various healthcare disciplines in regard to the use of simulations to support student learning. Examples of suggested approaches include telehealth, use of standardized or simulated patients, virtual and augmented reality, simulation debrief, games and gamification, and innovative approaches to active learning in an experiential setting. Available technologies are listed, as well as considerations for implementation of these technologies in the didactic and experiential settings. The authors also discuss the use of layered learning models, where upperclassmen assist in teaching lower-level students in clinical skills development.

In Chapter 13, Sourial et al. explore the impact COVID-19 placed on clinical skills development and how the pandemic impacted their approach to preparing learners for entry into practice. This chapter delves into the adaptation and innovation educators have embraced to ensure that skill development continued to occur in the non-traditional learning environment, providing a robust look at the innovative tools available to establish a virtual learning experience. Lastly, the authors examine the opportunities and challenges that occur when utilizing this approach, specifically noting the current and future impact on both clinical and soft skill development.

In Chapter 14, Bhushan et al. address the implications the pandemic had on graduate education and research, examining the potential long-term impact on Master of Science and Doctor of Philosophy programs in pharmaceutical sciences. The chapter provides a holistic examination of the role of graduate education in academia and practice, and how COVID-19 has changed the future of academic institutions. The authors delve into the pedagogical impact on graduate programs, explore the changes that may result in how research is conducted, and the support needed to individualize the learning experience for students seeking discipline specialization. Finally, the authors explore the pandemic's impact on faculty development and work/life balance.

In Chapter 15, Shewmaker et al. outline strategies for adapting traditional clinical experiences using Dweck's *Growth Mindset* as a framework. The chapter describes the authors' experience identifying alternative clinical opportunities for students within the College of Education and Human Services, specifically those in the Master of Science in Speech Language Pathology program, to retain the students' current graduation trajectory. To meet accrediting standards, students needed to complete their clinical placements in a time where clinical sites were closed to students finishing their health professions education. The authors describe the strategies implemented to create alternative clinical experiences, how they evaluated the effectiveness of these new innovative opportunities for continued, long-term implementation, and identified key strategies for continuing to address these challenges following the pandemic.

In Chapter 16, Sookaneknum et al. explore the rapid and dynamic changes COVID-19 caused within their educational programs, outlining the adjustments needed to respond to this unprecedented period. The authors provide an in depth look at six universities in the Association of Southeast Asian Nations and how each institution adapted the teaching pedagogy from traditional face-to-face interactions to support their learners during this pandemic. As each university had different characteristics, limitations, and challenges, the authors provide each institutions unique perspective and the lessons learned that enabled them to adapt and plan for future changes. Lastly, the authors address key factors (leadership, engagement, attitude, and deployment) that helped their programs successfully navigate the pandemic.

CONCLUSION

This book, *Handbook of Research on Updating and Innovating Health Professions Education: Post-Pandemic Perspectives*, examines the innovative and timely responses health professions faculty made to support learners as they navigated the COVID-19 pandemic. As a result of this unprecedented event, a sense of community has been established within higher education, forming best practices for faculty and student learning and support. The lessons learned during this period will have a lasting impact on higher education and the delivery of health professions education moving forward.

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Chapter 1
Supporting Diversity and Inclusiveness Amid a Changing Academic Landscape

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ABSTRACT

Prior to the pandemic, two-thirds of universities and colleges administered courses in the traditional face-to-face setting. After the abrupt change due to the pandemic, educators submerged themselves in virtual pedagogy and forged ahead in preparing the future workforce. An area that may have been overlooked was ensuring the learning environment remained diverse, equitable, and inclusive for all learners. Vital to students matriculating through programs and entering the healthcare workforce is recognizing and understanding student learning styles and having an ecological glimpse of circumstances that may affect their learning. Employing the intersectionality framework to explore inequities exacerbated by students' identities is a starting point. Implementing strategic priorities and DEI practices to decrease the equity gap that exists in the healthcare system and higher education institutions is essential. Health profession educators play a unique role in serving as change agents for future healthcare professionals who have a direct impact on health outcomes.

INTRODUCTION

Academic and career accomplishments in health professions are greatly influenced by students' learning styles and educators' pedagogy (DeCelle & Sherrod, 2011). Multimodal learning is common in health professions (Brottman et al. 2020; DeCelle & Sherrod, 2011). Therefore, educators in this field implement teaching strategies to highlight concepts through varying methods (reading, writing, visual, auditory, and kinesthetic) to ensure students can retain and apply the knowledge gained whether in a traditional

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classroom setting or online. The coronavirus (COVID-19) pandemic however, forced educators and students who were expecting to teach and learn in a traditional classroom setting to transition and adjust to an unexpected format. With this abrupt change in the middle of the semester came many challenges, but educators were determined to forge ahead in preparing the future health professions workforce. Many faculty submerged themselves in webinars and literature on virtual pedagogy to change their teaching strategies. In trying to get through and finish the semester in the midst of a global pandemic when a great deal was still unknown, an area that may have been overlooked was ensuring the learning environment remained diverse, equitable, and inclusive for all learners.

The pandemic created positive impacts in some aspects of learning, such as requiring educators to be innovative and creating flexibility. However, it also exacerbated cumulative inequities experienced by Black, Indigenous, and People of Color (BIPOC) (Gates et al., 2021). Most notably, the pandemic amplified the rates of infections and mortality for BIPOC communities, which had a direct impact on students of color. The adjustment to a higher reliance on virtual learning also heightened the digital divide. Lack of reliable internet access or personal computer access, and the convergence of the home and learning environments created challenges for students' learning experiences. These experiences hold direct practice implications toward perpetuating inequities that oppose the ethics and values of health professions. Refocusing on diversity, equity, and inclusion (DEI) impacts the success of health professions programs and the healthcare system. Implementing strategic priorities and DEI practices to decrease the equity gap that exists and focuses on promoting inclusive learning environments is essential.

The objective of this chapter is to reinforce the need to support DEI amid a changing academic landscape. The chapter begins by highlighting the continued significance of DEI in health professions. The chapter then details the use of an intersectional and ecological lens to explore and understand student identities in creating an inclusive learning environment. The chapter also presents challenges, strategies, and action steps for supporting students during this change in their learning environment with inclusive pedagogical practices. The chapter closes with future directions and reinforces the logic and responsibility for incorporating DEI practices.

BACKGROUND

The COVID-19 pandemic brought to light complexities that exist in the healthcare system. Particularly, health and healthcare disparities were on display in the disproportionate rate of infections, hospitalizations, and mortality, which affected BIPOC in comparison to White people as, depicted in Table 1. For instance, American Indian/ Alaska Native persons had 3.3 times more hospitalizations than White persons.

Table 1. Comparison by race/ethnicity of Covid rates of infection, hospitalization, and deaths as of May 1, 2021

Rate ratios compared to White persons	Hispanic or Latinx persons	Black/African American persons	Asian persons	American Indian/ Alaska Native persons
Cases	2.0X	1.1X	0.7X	1.6X
Hospitalizations	2.8X	2.9X	1.0X	3.3X
Deaths	2.3X	1.9X	1.0X	2.4X

Source: (Centers for Disease Control and Prevention, 2021)

A health disparity is a higher burden of illness, injury, disability or mortality experienced by one group relative to another, and health care disparities are differences between groups in health insurance coverage, access, utilization, and quality of care (Brottman et al., 2020; Ndugga & Artiga, 2021). Health and healthcare disparities are a result of long-standing issues in the US, which stem from personal, environmental, and systemic factors, and include structural and institutional racism. Disparities occur across many dimensions, including race/ethnicity, socioeconomic status, age, location, gender identity, sexual orientation and disability status (Ndugga & Artiga, 2021). BIPOC are at increased risk of disparities and are disproportionately affected by treatable medical conditions (Betancourt et al., 2013; Institute of Medicine [IOM], 2003; Robert Wood Johnson Foundation [RWJF], 2014). Access to and quality of care contribute to these disparities. When controlling for several factors such as comorbidities, and socioeconomic status, BIPOC still receive a lower quality of care in comparison to White people (Betancourt et al., 2013; IOM, 2003; RWJF, 2014; Wilbur et al., 2020). Race and ethnicity should not be a predictor of the quality of health care service delivery.

In 2020, there was also an awakening of injustices experienced by BIPOC due to the senseless murders of unarmed Black/African American men and women, in addition to unwarranted coronavirus racist attacks on Asian Americans. Structural racism also exists in higher education institutions and contributes to disparities faced by BIPOC students (Burke, 2020; Stockdill & Danico, 2012). BIPOC students are more likely than their White peers to experience some form of discrimination (Metzger et al., 2020). Administrators, faculty, and staff's implicit bias towards BIPOC students further perpetuates systemic issues. Inequitable conduct by faculty or the tendency to not get involved when students are discriminated against diminishes diverse students' academic success, creating barriers in program connection, sense of belonging, and other adverse outcomes (Iduye et al., 2020; Metzger et al., 2020). With the move to virtual instruction due to COVID, prioritizing diversity and inclusiveness in the learning environment is imperative to ensure equitable experiences for students. **Diversity** understands, recognizes, and appreciates the differences in people (Metzger et al., 2020). **Equity** seeks to ensure fair practices and policies, which allow all students to have an opportunity at success (Jones et al., 2019; Smith & Ayers, 2016). **Inclusion** is the practice of providing a safe environment, resources and opportunities for all students (Iduye et al., 2020; Metzger et al., 2020; Yeboah & Smith, 2016). Both equity and inclusion are essential components of diversity. In health professions programs each element plays an integral role in enhancing cultural awareness, innovation, critical thinking, and cultivating an environment for patient-centered care as a future practitioner.

Almost two decades ago, *The Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Car*e report identified increasing the diversity of the healthcare workforce as a recommendation for addressing and eliminating racial and ethnic disparities (Betancourt et al., 2013; IOM, 2003; Wilbur et al., 2020). Yet, almost two decades later, a gap still exists in achieving this goal. Table 2 highlights the gap which exists in BIPOC health professionals. The table first includes the number and percentage in the healthcare workforce by race/ethnicity in the US, and then details the percentage by race/ethnicity of Health Diagnosing and Treating Practitioners in the US. Except for Asians, all BIPOC are underrepresented in every category in comparison to the general population. (U.S. Department of Health and Human Services [HHS], 2017; Wilbur et al., 2020).

The U.S. Census Bureau (2012) estimates underrepresented groups will become the majority in the mid-2040s. As the US population becomes more diverse, it is especially important now more than ever, for the healthcare workforce to be reflective of the populations served. Social accountability of health professions schools is defined by the WHO as "the obligation to direct their education, research, and service activities toward addressing the priority health concerns of the community, region and/or nation that they have a mandate to serve" (as cited in Simone et al., 2018, p. 762). In the US, a priority concern is racial and ethnic disparities in healthcare. The inequities experienced by BIPOC lead to worse clinical outcomes, and higher mortality rates, which equates to an economic burden of $60 billion (RWJF, 2014). These disparities shed a light on the differences experienced by patients in health coverage, access to care, and care delivery, including clinical encounters (Armstrong et al., 2007; Betancourt et al., 2013; IOM 2004).

Table 2. U.S. health diagnosing and treating practitioners' occupations by race/ethnicity, 2011 - 2015

		Non-Hispanic					
	Hispanic/ Latinx	**White**	**Black/ African American**	**Asian**	**American Indian/ Alaska Native**	**Native Hawaiian & Other Pacific Islander**	**Multiple/ Other Race**
U.S. Workforce-(number)	(25,776,728)	(102,850,895)	(18,597,223)	(8,534,837)	(902,977)	(251,578)	(2,910,64)
U.S. Workforce-percentage	16.1	64.4	11.6	5.3	0.6	0.2	1.8
Health Diagnosing and Treating Practitioners Occupations							
Advanced Practice Registered Nurses	4.5	84.0	5.7	4.1	0.2	NR	1.3
Chiropractors	3.7	86.7	1.9	5.4	0.5	NR	1.8
Dentists	6.1	74.8	3.0	14.3	(0.1)	NR	1.7
Dietitians and Nutritionists	8.5	68.7	15.0	6.0	0.3	(0.1)	1.4
Optometrists	3.9	78.4	1.8	13.7	NR	NR	1.8
Pharmacists	3.7	70.4	5.9	17.9	0.2	0.1	1.8
Physicians	6.3	67.0	4.8	19.6	0.1	0.0	2.1
Physician Assistants	10.0	72.7	7.1	7.3	0.6	NR	2.2
Occupational Therapists	4.0	83.8	4.4	6.6	0.2	NR	1.1
Physical Therapists	4.8	77.8	4.4	11.1	0.2	(0.1)	1.6
Respiratory Therapists	7.9	70.1	12.8	7.0	0.5	NR	1.7
Speech-Language Pathologists	6.2	86.1	4.1	2.2	0.3	NR	1.0
Registered Nurses	5.7	73.5	10.4	8.4	0.4	0.1	1.5

Source: (U.S. Department of Health and Human Services Health Resources and Services Administration Bureau of Health Workforce National Center for Health Workforce Analysis, 2017)

USING AN INTERSECTIONAL & ECOLOGICAL LENS IN HEALTH PROFESSIONS

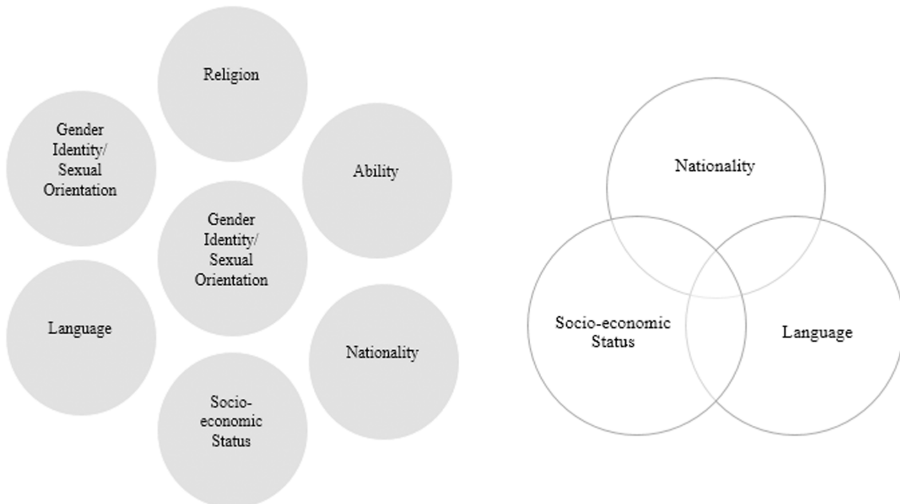
Ecological Lens

In making adjustments to ensure equity in the learning environment, it is important to acknowledge the **biopsychosocial** needs (which require accommodations and support) of students. Various biopsychosocial factors (i.e., age, gender, disability and socio-economic status) may determine one's ability to attend higher education and then further create obstacles in achieving equity. Equity recognizes that students do not come into the learning environment with the same resources or preparation, especially if from a lower socio-economic status and underserved community (Gay, 2013; Geda & Meyer, 2020). Accessibility (i.e., access to resources and support) plays a pivotal role in students' learning and academic achievements (Markova et al., 2017). For instance, the immediate shift from the traditional classroom to solely online during the pandemic created accessibility challenges for some students. The shift required students to have access to resources (e.g., reliable internet, personal computers, and study spaces) for continued engagement and learning. Thus, creating an assumed narrative that students may have more availability and the same access to needed resources for online learning (Lederman, 2021).

Intersectionality Framework

The tendency is often to relate diversity to race and ethnicity alone; however, diversity also incorporates several other characteristics to include culture and other sociodemographic variables. An intersectional analysis allows educators to view students' identities of race, ethnicity, gender identity, sexual orientation, socioeconomic status, nationality, religion, ability, and age "not as unitary, mutually exclusive entities, but as reciprocally constructing phenomena that in turn shape complex social inequalities" (Collins, 2015, p. 2). Educators working within an **intersectionality** framework attempt to account for the complexities and implications of a student's multiple marginalized identities (Crenshaw, 1989). Rethinking frames of students' identities as a pedagogical strategy is one potential application for applying intersectionality in health professions education (Tefera et al., 2018). Incorporating this action highlights the importance of how the multiplicity of student identities shape the structural dynamics of power and inequality in social spaces, especially the learning environment (Carbado, et al., 2013). Figure 1 depicts an illustration of intersectionality. The left side of Figure 1 includes examples of identities, and the right portrays what intersectionality may look like for a student from multiple historically marginalized groups - a refugee who recently moved to the US, with limited English proficiency, and has a low socio-economic status. Through an intersectionality lens, directing the student to resources for limited English proficiency, connections to the multicultural students office that may enhance the students sense of belonging, and providing electronic access of the initial class readings (in the event the student is awaiting financial aid to purchase/rent textbooks) will have a favorable impact to the student's learning. An intersectional analysis highlights the importance of exploring how intersections of identities shape students' lived experiences and how these experiences influence their advancement in health professions education, thus increasing faculty's understanding of student differences and visibility of marginalized groups within the learning environment. Adopting an intersectionality approach may allow for a more diversity-inclusive learning climate to include fostering positive interactions between faculty and students of diverse backgrounds (Muntinga et al., 2016).

Figure 1. Example of intersectionality for a student who identifies under multiple groups
Source: Adapted from National Association of School Psychologists, 2017



Another notable benefit of advancing an intersectional perspective in the learning environment is aiding faculty in explaining health inequity and finding new solutions to the disparities that exist within healthcare systems (Heard et al., 2020). Health professions education is a key avenue for exploring health and healthcare needs. Scholars in medical education and health research posit that intersectionality can serve as a progressive teaching framework for examining the role of intersections of multiple bio-socio-cultural group memberships in patients' identities, experiences, and health needs (Hankivsky et al., 2014; Muntinga et al., 2016; Sears, 2012). Students' ability to analyze health-related differences and health outcomes for patients through an intersectional lens provides insights into health inequalities specific to groups facing intersecting forms of discrimination (Bauer, 2014; Bowleg, 2012).

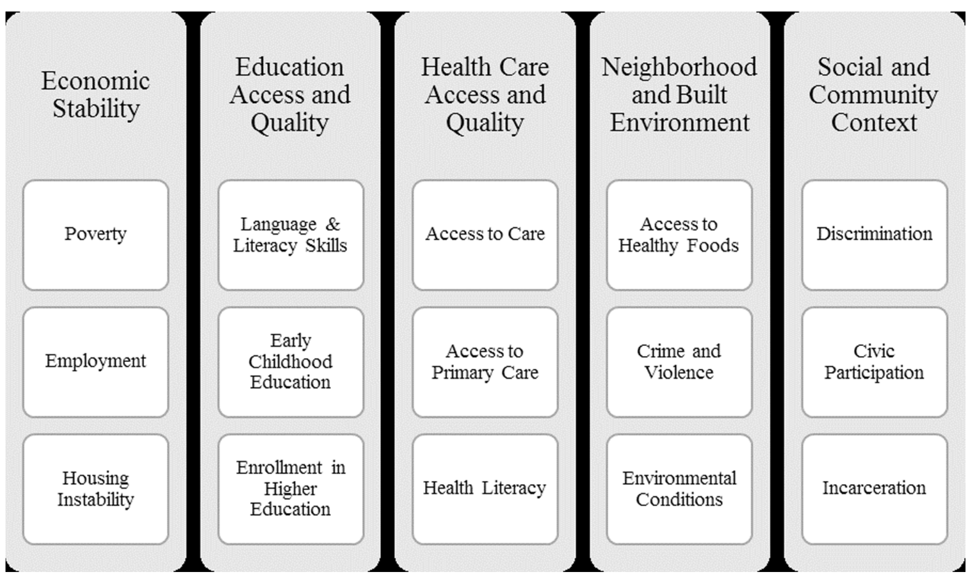
Achieving equity not only in educational outcomes, but also in the overall health among marginalized groups requires a move beyond focusing on personal-level factors to structural factors, such as social determinants of health (National Academies of Sciences, Engineering, and Medicine [NASEM], 2016). For health professions, advancing health equity requires greater attention to assessing social determinants of health.

Social Determinants of Health

The World Health Organization (WHO) defines social determinants of health (SDOH) as the "conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life" (2021, para. 1). There are five SDOH domains: social and community context, neighborhood and built environment, economic stability, education, and health and health care, which are depicted in Figure 3 (Office of Disease Prevention and Health Promotion, 2020). SDOH are the key drivers of health and health disparity outcomes impacting communities and populations (Jones et al., 2019; Siegel et. al., 2018). Greater attention to the SDOH and equity can make progress towards equitable outcomes (Jones et al., 2019).

Educators in health professions play an important role in addressing SDOH. Enhancing students' application and understanding of SDOH is key in providing culturally appropriate patient care (Brottman et al., 2020). As such, integrating content within the curriculum through simulation, discussions, and case-based learning about SDOH expands students' overall knowledge and confidence to address these major drivers of health disparities (NASEM, 2016). Case studies considering a holistic view instead of only a medical focus provides an application for the student and trains future health professionals on pragmatic strategies for disease management. For instance, in discussing health promotion and disease prevention, we know that behavior modification has the greatest impact on counteracting key risk factors. However, this is not as simple as exercising, and switching to a healthier diet. Incorporating SDOH in this patient analysis shifts the focus solely from personal level factors to include the neighborhood and built environment or economic stability domains. The economic stability domain would recognize the impact of affordability of a gym membership or cost of healthier foods. Assessing the built environment takes into consideration the impact of access to a neighborhood park or sidewalks or even streetlights for the patient to be able to safely walk or exercise in the evening after work. This also takes into account if the neighborhood is in a food desert, creating a barrier for access to fresh foods and vegetables. Integrating social determinants of health and health equity into the curriculum can provide future healthcare professionals with a comprehensive understanding of the complex social problems, which have a devastating impact on health outcomes (Thomas & Booth-McCoy, 2020). Similar to the example above, Figure 2 explores aspects in addressing each SDOH domain.

Figure 2. Social determinants of health domains
Source: Office of Disease Prevention and Health Promotion, 2021



SOLUTIONS AND RECOMMENDATIONS

Essential to students matriculating through programs and entering the health professions workforce is ensuring students learn four pivotal elements: motivation, reinforcement, retention, and transference (DeCelle & Sherrod, 2011, p. 75). To accomplish this, educators must have an understanding of students' learning styles and have an ecological glimpse of circumstances that may affect their learning (Burnham, 2020; DeCelle & Sherrod, 2011). Faculty engagement and flexibility is an integral component to student participation and success in the learning environment (Iduye et al., 2020; Metzger et al., 2020). The use of culturally responsive teaching strategies by educators promotes the success of diverse students. Preparation for diverse clinical encounters through informal curriculum, engaging in race dialogues and taking a closer look at the digital divide is imperative to confronting racism and ensuring inclusiveness in the learning environment. A commitment from leadership is required to provide an inclusive environment for all students, but especially for students from marginalized backgrounds who experience discrimination regularly (Bensimon, n.d.; Enger, 2006).

Commitment from Leadership

The recruitment of diverse faculty and students within higher education institutions does not automatically create an inclusive learning environment. Diversity without equity brings symbolic advantages to institutions of higher education but provides a minute effect on creating an inclusive learning environment for students from diverse backgrounds (Bensimon, n.d.). A commitment from senior leaders in promoting DEI efforts is important for supporting diverse students. These efforts must reach beyond the use of DEI terminology in the mission and vision statements to direct action. Examples of direct action include: infusing DEI as a core principle by examining and updating institutional policies, allocating resources to DEI efforts, and including DEI-related performance measurements in the strategic plan. Performance measures however are just that, measures. Therefore leadership cannot only rely on measures to be effective in creating a diverse, equitable, and inclusive institution. Measures provide the ability to assess, and then improve efforts (action).

As with any performance data, these measures must be SMART (specific, measurable, attainable, relevant and timely) and clearly define how success is measured. A 5% increase in Black males matriculating in health professions programs is a performance measure which prioritizes the crisis of the enrollment decline specifically in this population prior to the 2020 academic year. A case report on the integration of cultural competence in physical therapist education noted the increase in diverse students after "developing culturally competent practitioners" was a core principle added to their strategic plan (Romanello, 2007, p. 35). Program faculty action steps included: reassessing their recruitment and admissions criteria, integrating culture into the curriculum, and adding diverse immersion experiences (Romanello, 2007). A 5% increase in recruiting tenured BIPOC faculty in health professions programs is an example of an institutional measure supporting an objective in the strategic plan that may focus on strengthening recruiting and retaining diverse faculty. As an action step for recruiting more diverse and culturally competent faculty, Sorensen et al. (2017) suggest definitively stating efforts to recruit qualified medical school teachers reflective of the cultural diversity within the community, with a condition of attending training as part of their contract for applicants not meeting this requirement.

Additionally, with the lack of diverse faculty and the under-enrollment of BIPOC students in health professions programs, cultural competency practices are necessary (Wilbur et al., 2020). Health professions program administrators must allocate resources to train future healthcare professionals in cultural competency to prepare them for patient-practitioner interactions with diverse populations, and also incorporate culturally responsive teaching in the curriculum. Society continues to endorse negative stereotypes towards BIPOC in regards to a lack of intelligence, an increase in violence, and a preference for public assistance (IOM, 2003). This translates into micro-aggressions, **implicit biases,** and discriminatory experiences in the healthcare setting and health professions programs. Using an implicit bias test (https://implicit.harvard.edu/implicit/takeatest.html) is an initial step that each administrator, faculty, and staff in health professions educational programs can take to recognize and be more self-aware of their own biases (Project Implicit, n.d.). The goal is progression from awareness and acceptance to intentional behavioral change, and mitigation of implicit biases (Thomas & Booth-McCoy, 2020).

Support for educators to be equipped with the necessary tools in a virtual platform is essential to meet the needs of diverse students. Creating programs and taking action to support the "humanizing" pedagogical strategy is a great starting point in focusing on the equity gap because it recognizes that learning environments are not neutral (Pacansky-Brock et al., 2020, p. 2). "Humanizing recognizes that engagement and achievement are social constructs developed through the background and experiences students bring to college and the educational environment provided for them" (Pacansky-Brock et al., 2020, p. 2). Pacansky-Brock et al. stress the importance of empathy, a sense of community, and connection in promoting engagement and rigor (2020, p. 1).

Engagement and Flexibility

Faculty presence has a direct impact on **student engagement** (Hines et al., 2020; Iduye et al., 2020). Hines et al. (2020) note student engagement is a fundamental aspect of effective teaching. Educators must promote an inclusive learning environment by incorporating intentional strategies to motivate the engagement and active participation of diverse students in online learning (Iduye et al., 2020; Metzger et al., 2020). Research has indicated students from BIPOC backgrounds are less likely to thrive in an online learning environment (Ibarra, 2000; Pacansky-Brock et al., 2020; Smith & Ayers, 2006). Saiyad et al., emphasizes that "technology is not a replacement for pedagogy" (2020, p. 2). Online learning tends to be designed for the organized/structured learner who is able to work independently, thus, decreasing the potential for peer interaction and student/faculty engagement (Markova et al., 2017). Prioritizing efforts to increase and facilitate interactions would be beneficial in decreasing a sense of isolation for students (Enger, 2006; Markova et al., 2017). This creates an opportune time for faculty to support students who may not have been as vocal in class discussions in the traditional classroom setting (Enger, 2006).

Online learning in some cases (asynchronous courses) provide students with flexibility in learning the content at their own pace (Saiyad et al., 2020). Educators must become students themselves to increase their proficiency in technology, in addition to pedagogical strategies promoting equity, learning in a social context, and delivering materials remotely for students to retain the information (Nasr, 2020). Similarly, in the traditional classroom setting, students rarely learn by only listening to lectures; thus, it is important to have a variety of strategies to encourage interaction and engagement (Saiyad et al., 2020). Teaching methods and assessments must still be created to match the curriculum and meet the course objectives (Saiyad et al., 2020). Educators must switch from relying only on in-person pedagogical methods to those also relying on technological competencies and assessing students more creatively (Nasr, 2020; Saiyad et al., 2020).

Active learning strengthens students' experiences through engagement (Hines et al., 2020; Smith & Ayers, 2006). The key components of active learning activities include: 1) the curriculum is learning-focused, shifting from the traditional classroom setting of content-focused, 2) students are engaged with course content and requires higher-order cognitive skills, 3) promotes communication between all parties (students with each other, and educator with students), and 4) must be a requirement and therefore assessed (Hines et al., 2020). Transitioning from a traditional-based course (especially those taught in labs, and in the field) to online can be challenging, educators must be innovative and resourceful in meeting the learning objectives. Additionally, educators must take the time during the initial classes to provide an overview of the forum, and guidelines for navigating the platform, noting miscommunication can arise in virtual learning, especially if there are barriers (Yeboah & Smith, 2016).

Implementing interactive activities may also enhance the engagement of diverse student learners and promote equity and inclusiveness in the learning environment. Creating videos on YouTube and utilizing Microsoft PowerPoint are simple ways to create learning modules that are practical for diverse students (Nasr, 2020). The use of social media forums, Flipgrid, photographs, videos, virtual group collaborations, and discussion posts may also be used as alternative methods of assessment (Nasr, 2020). Online discussion posts are also an effective tool in facilitating communication among students of diverse racial and ethnic backgrounds. Yeboah and Smith (2016) report that discussion boards foster engagement and cultivate self-confidence in diverse student populations by allowing them to feel heard without the pressure of being singled out due to their differences.

Equitable Experiences

The digital divide highlights the inequities of access to personal computers, quality computers, and Wi-Fi for students. Although these inequities existed before COVID, they were brought to light as we have relied more on technology in every aspect (Lederman, 2021). Since on-campus resources such as study spaces at the library, access to free Wi-Fi, and access to computer labs around campus were provided, this may not have been a focus for higher education institutions in the past (Lederman, 2021). When the home and learning environment intersected, in some cases an immediate learning barrier was created for students. Having to drive to restaurant parking lots to access Wi-Fi for classes or to complete homework, sharing a computer with other family members, having an older computer and always needing to be near an outlet to keep a charge, or not being able to download a required class program created challenges for students. Establishing a balance to support students to excel in their studies, but at the same time not invading their privacy is important (Lederman, 2021). During the *Higher Ed's New Digital Divide podcast,* it was suggested to survey students at the start, to be able to identify technology difficulties and create a plan for the semester (Lederman, 2021). Institutions can no longer ignore the inequity in technology access, as students also learn away from campus. Creating equitable technology access for disadvantaged students enrolled in higher education programs is key to optimal learning when students are not on campus.

In the traditional classroom setting, proctored examinations were regularly used as an assessment tool for student learning. With the shift to an online format, educators turned to proctoring software to continue utilizing this assessment. Proctoring software serves essentially as a webcam surveillance system using an automated algorithm to detect normal or suspicious behavior while participating in an online examination (Swauger, 2020). Although the software is intended to uphold academic integrity, it is vital to recognize that the software algorithms were structured to benefit the "White majority."

Swauger shared that "as a cisgender, able-bodied, neurotypical, white man, these technologies generally categorize my body as normal and safe, and because of this, they would not endanger my education, well-being, employment, or academic standing" (2020, para. 1). Prior to the start of the examination, students with darker skin tones are often not recognized, and requested to increase the lighting to show their facial features; the software literally is not able to see them (Swauger, 2020). The software is also consistently unable to differentiate between students from Asian backgrounds (Swauger, 2020). Students who identify contrary to cis/heterosexual gender may also have difficulty verifying their identity if the name or gender expression on their identification is flagged or not accepted (Swauger, 2020). Flagging of suspicious behavior prior to the start of the exam, or not allowing the student to take the exam due to a system that expects non-White students to conform to what is considered the baseline, only adds additional stressors to the students to be able to concentrate and do well on the exam. These discriminatory practices further intensify a lack of belonging for BIPOC students.

Additionally, the flagged suspicious behavior may negatively impact students who are non-traditional, have medical conditions impacting movement, and auditory learners. One of the traits of auditory learners is reading aloud to understand and retain information. This is however flagged as 'suspicious behavior' as the student is seen talking (interpreted as the test taker having a conversation with someone) (Swauger, 2020). Similarly, students who are unable to sit for extended periods are also flagged. Any additional movement, for instance if a non-traditional student has a young child enter the viewing screen, is flagged. A student also shared the difficulty in having her grandmother keep still and not move around when she was taking an exam using Respondus (Lederman, 2021). Since companies such as Proctorio, ProctorU, and Respondus have adapted automated algorithms, instructors reviewing 'flagged' students from proctored software need to consider and be aware of their own biases when reviewing a system that was developed for only certain students to thrive. Higher education institutions cannot become complicit and support such technologies which are discriminatory and biased. Inequitable experiences such as these have long-term consequences on diverse students successfully matriculating through health professions programs.

Supporting diversity and inclusiveness amid a changing landscape will have a long-term impact on future healthcare professionals. Not only does it create a sense of belonging for BIPOC students, but all students gain a comprehensive understanding of the subject matter and are better prepared to flourish in the workforce because of their exposure to diversity and inclusiveness even in a virtual platform.

Culturally Responsive Teaching

Culturally responsive teaching (CRT) is essential to meeting the biopsychosocial needs of students (Ebersole et al., 2016; Gay, 2002; Heitner & Jennings, 2016). CRT is defined as "using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively," (Gay, 2002, p. 106). Educational scholars can expand their own cultural perspectives by consciously making connections with their students instead of simply adding to teaching activities (Ebersole et al., 2016). Smith and Ayers (2006, p. 402) indicate that it is important for educators to "understand the cultural perspectives, learning styles, and cognitive and psychological ethos" of students. Five crucial elements are incorporated in CRT: developing a cultural diversity knowledge base, designing culturally relevant curricula, demonstrating cultural caring and building a learning community, cross-cultural communication, and cultural congruity in classroom instruction (Gay, 2002).

Developing a cultural diversity knowledge base goes beyond mere consideration of diversity content. It involves integrating factual information into course content on uniqueness, features, and cultural elements to stimulate learning for diverse students (Ebersole et al., 2016; Gay, 2002; Murray-García et al., 2014). CRT involves acknowledging the existence of cultural differences in learning, in addition to challenging injustices and bias (Gay, 2002). Culture shapes beliefs and values, which influence students' perspectives and how they interpret and comprehend information (Smith & Ayers, 2006). Therefore, it is important for health professions educators in creating equitable learning environments to learn more about cultural differences of students, including gender role socialization and communication and learning styles. This will aid in creating and implementing activities to promote educational motivation and task performance of diverse student populations.

CRT uses knowledge, understanding, and sensitivity of diverse needs to guide the development and assessment of the course (Gay, 2002; Heitner & Jennings, 2016). It is important to not just focus on only one sub-group for developing course content (e.g., race or gender identity), but instead create spaces to include context for a wide range of diverse socio-demographics (e.g., nationality, military, abilities, ethnicity, sexual orientation, and socioeconomic status). One example is to consider the unique characteristics of military personnel in the learning environment, or the fact that over 40% of students are non-traditional, which can be incorporated into pedagogical strategies (Heitner & Jennings, 2016; Ke, 2010).

Designing culturally relevant curricula is the next pivotal element. Curricula can be classified as formal, societal, or symbolic. An approved curriculum by policy and/or governing boards of educational systems are considered formal curricula. CRT suggests improvements can be made to formal curricula to be more reflective of the experiences of diverse identities. One example of this is to contextualize oppressive experiences of diverse groups in course content. Explicitly addressing the 'isms' experienced by marginalized populations versus omitting to avoid controversy is important to address iniquities and discourse (Gay, 2002).

Societal curricula is largely reflective in mass media. However, the knowledge and impressions shared are often inaccurate and may generate bias and prejudice in the course curricula. To avoid biased information entering into the learning environment, it is important for health professions educators to be aware of how BIPOC images are manipulated in the media to avoid perpetuating these biases and for teaching future professionals (Gay, 2002). **Symbolic curriculum** includes the use of celebrations, storyboards, and other artifacts as a means for students to gain knowledge about people and concepts from diverse backgrounds and cultures. Health professions educators assessing how to infuse elements of symbolic curriculum into their courses may consider the following: Do the required textbooks only reflect a certain group? Do supplemental assigned readings and case studies discuss the health of diverse populations and health disparities? Do students have an understanding of social determinants of health? BIPOC contributions in health professions, science, and technology can be intertwined in the curriculum by using textbooks that are representative of the population, and supplemental assigned readings or case studies. Storyboards or artifacts can also be used throughout the year to illustrate these contributions. Educators can also ensure images displayed in lectures are inclusive of place, socio-economic status, gender identity, age, ability, race/ethnicity when discussing a range of topics (Gay, 2002). By adopting the use of symbolic curriculum, educators illustrate to students how diversity applies to everyone, and why inclusion and cultural competency is important as a future health professional.

The third element of CRT is *demonstrating cultural caring and building learning communities*. This does not equate to "gentle nurturing and altruistic concern," which can be detrimental to BIPOC students making progress and moving at their own pace (Gay, 2002, p. 109). It involves demonstrating compassion and creating learning communities inclusive to learning for all students. Bringing students' own lived experiences and culture into the learning environment contributes to fostering a culture of awareness and enhances students' intellectual capabilities (Gay, 2002; Heitner & Jennings, 2016). Believing in the "intellectual potential of these students and accept, unequivocally, their responsibility to facilitate its realization without ignoring, demeaning, or neglecting their ethnic and cultural identities" is pivotal to demonstrating cultural caring (Gay, 2002, p. 110). Making connections with students to ensure they do not feel isolated and providing flexibility are two attributes of showing compassion in an online classroom (Nasr, 2020). An example of this could be an educator providing a scanned copy of the first chapter of the textbook, and including informational videos on the learning management system portal to complement the content. This would provide access to a student with economic challenges to progress with their cohort and not be delayed in the initial week while awaiting financial aid to purchase course materials. Educators establishing an emotional connection with students in times of change and uncertainty is also important (Imad, 2020). Health professions educators building cultural caring learning communities require a balance of rigor and support. Challenging your students is necessary, but rigor does not equate to an increased workload (Imad, 2020).

Communicating with ethnically diverse students is the fourth essential element. This includes creating an inclusive community where students are not afraid to share their lived experiences, and are not overlooked. Discussion boards are essential tools to promote participation and increase cross-cultural dialogue between students. Educators must not default to a dominant culture's communication, but have the awareness that expressive characteristics vary among cultural groups (Gay, 2002). Burnham (2020) suggests inspiring BIPOC students to use their 'cultural capital' to share their lived experiences but ensuring not to make them feel like the representative of their group and putting them on the spot.

The final element of CRT is *cultural congruity in classroom instruction*. Having a multicultural teaching context builds bridges and intersects students various cultures and learning needs (Gay, 2002). Acknowledging and responding to cultural diversity in the delivery of instruction frames each of the other four elements (Gay, 2002; Heitner & Jennings, 2016). It is imperative for health professions educators to realize how culture shapes the course and confront misconceptions on learning styles (Gay, 2002). Educators understanding their own socio-cultural history and cultural identity connects them to places of privilege and/or oppression (Ebersole et al., 2016).

By taking action in creating a respectful and inclusive community, health professions educators ensure an environment for all students to thrive. Requiring books such as *The Spirit Catches You and You Fall Down* provides students with an understanding of the interaction and complexities of culture within the health system (Fadiman, 1997). Discussions, reflections, and lived experiences can be incorporated into the lecture to provide application on various avenues in the system including patient-practitioner encounters. Creating CRT practices require health professions educators to use an intersectional ecological lens in contexts and on subject matters that evolve (Ebersole et al., 2016). Merely providing information can play into negative stereotypes (Burnham, 2020; Ebersole et al., 2016), thus emphasis on transformational learning and critical reflection are key (DeCelle & Sherrod, 2011). Higher education institutions must have articulated commitments, and provide training for faculty to develop and incorporate CRT pedagogical practices into their curriculum (Ebersole et al., 2016). CRT fosters greater multicultural understanding in the learning environment, and prepares culturally competent practitioners.

Race Dialogues

The overlapping crises of the coronavirus (COVID-19) pandemic and the social unrest that ensued after the tragic murder of George Floyd, drew attention to the inequities that existed in the United States, thus furthering the need to address the impact of injustices through open dialogue in health professions curricula. Metzger et al. noted that nursing students from underrepresented minority groups report experiencing discrimination from all contact settings (2020). This includes discrimination from peers and faculty in the classroom whether subtle or overt, and in the larger institution and community setting (Metzger et al., 2020). It is suggested for educators to intervene in virtual inequities stemming from disparities and embrace pedagogical strategies that integrate ethnic diversity into curricula on a habitual basis (Gay, 2002). Colleges and universities can have workshops and trainings to prepare faculty to facilitate dialogues around race/ethnicity and racism. These trainings can address how to handle instances when students are discriminated against in classes and clinical settings.

Dr. Sherilynn Black at AcademyHealth's Annual Research Conference in 2020 so eloquently stated, "Race is not a risk factor, racism is the risk factor." Future health professionals also need to be aware of how prejudice, discrimination, stereotypes, and bias impact how medical care is delivered. If not discussed in the educational setting, these behaviors can be destructive to the care continuum for vulnerable populations. For instance, this results in patients having limited access to resources and receiving substandard care (Betancourt et al., 2013). Studies have shown practitioners in the clinical encounter show less empathy and are less attentive to non-White patients, thus, highlighting a need to include discussions around structural racism and the long-term effects on health outcomes (Basáñez et al., 2013; IOM, 2003; Johnson et al., 2004; Murray-García et al. 2014; Thomas & Booth-McCoy, 2020). Murray-García et al. (2014) noted the importance of going beyond the generalized awareness of other cultures and teaching future health professionals specifics to eliminate the racial and ethnic disparities that exist in healthcare services. Cross-cultural communication skills are necessary for non-discriminatory and equitable clinical practice. Learning environments, whether in-person or online creates opportunities for students from diverse cultures to engage in communication with one another. Culturally responsive teaching and race dialogues are important teaching strategies that educate future health professions on the patient-practitioner encounter.

Clinical Rotations/Encounters

Medical and other health professions curricula have the ability to transform the healthcare system by developing a culturally competent workforce. An educational environment that tackles discrimination, prejudice, and bias on individual and population health levels will have an instrumental impact on the system (Thomas & Booth-McCoy, 2020). Implicit biases in the clinical decision-making process influence how medical care is delivered. Practitioners consciously or subconsciously apply beliefs about certain groups to individuals (Betancourt et al., 2013). Due to the pandemic, workforce shortages required some students in health professions programs to enter clinical practice earlier then their traditional timeline, thus bolstering the need for strategies in the informal curriculum for students to apply in clinical rotations/encounters with patients, and interactions with healthcare professionals.

Figure 3 provides examples of DEI approaches to decrease bias. For example, reflective writing, case reviews, and clinical vignettes provide opportunities for safe space discussions on the effect on biopsychosocial needs, intersectionality, and the social determinants of health on health care access, quality, and delivery (Brottman et al., 2020; Thomas & Booth-McCoy, 2020). The four tenets of cultural competence (awareness, attitudes, knowledge and skills) develops strategies to intentionally overcome biases which can be provided through training from the National Standard on *Culturally and Linguistic Appropriate Services* (CLAS) (Brottman et al., 2020). Requiring students to take an implicit association

Figure 3. Strategies for decreasing bias
Source: Adapted from Thomas & Booth-McCoy, 2020

test brings awareness to one's biases, which then progresses intentional behavior changes, and mitigation of implicit biases to improve the practitioner-patient encounter (Thomas & Booth-McCoy, 2020). Additionally, these strategies provide professional and intrapersonal development to health professions students (Thomas & Booth-McCoy, 2020). Immersing faculty and students in diverse environments broadens the knowledge and application of cultural competency. One example is choosing clinical sites with multiple diagnoses/diseases and diverse cultural groups reflective of the population (Romanello, 2007; Thomas & Booth-McCoy, 2020). An international experience also provides students with a different perspective. Prior to the pandemic, the cost of an international experience might have created a barrier; however, a virtual experience still allows students to immerse themselves in the culture. Students who participated in a virtual experience at a University in India increased their knowledge and understanding of holistic medicine (i.e., yoga, Ayurveda). Immersion experiences can also include community collaborations with local high schools in underserved communities to provide early exposure to careers in health professions (Romanello, 2007). Strategies for supporting DEI in health professions is a continual process. Utilizing educational strategies such as CRT, self-awareness and mitigation of biases, engaging students in dialogue, immersing students in cultural experiences, and decreasing the digital divide are approaches which can be used to develop a more diverse and culturally competent workforce in health professions amid a changing academic landscape.

FUTURE RESEARCH DIRECTIONS

In some aspects, higher education institutions lagged behind other industries in virtual platforms, still largely utilizing the traditional classroom setting. Before the pandemic, two-thirds of campuses had traditional in-person lectures, and only five percent of college budgets were dedicated to information technology (Gallagher & Palmer, 2020). Though the pandemic left educators no choice in embracing virtual platforms, the shift has caused university/college leaders to make digital platforms and technology a crucial strategic priority (Gallagher & Palmer, 2020). As the paradigm shift takes place for using a single distributed platform for online-based programs, it is imperative for faculty to also embrace diverse pedagogical virtual practices.

Equally important is providing equitable technology access for students. In the future, more institutions will need to create intentional partnerships with internet providers and computer/software companies (Lederman, 2021). This creates the ability for wireless equity and accessibility to tablets or laptops for every student (whether given at admission or as a long-term loan for students to keep post-graduation). Institutions can highlight this as a need to their donors, so financial donations can be allocated to equitable technology access for students.

The online environment removes external pressure from peers in the classroom. Enger (2006) believes virtual platforms are a prime opportunity to focus on the lack of a sense of belonging that exists for BIPOC students on a traditional homogeneous college campus. As the US population moves towards a ‘white minority’ in the near future, institutional and policy-level strategies must continue to be inclusive of diversity, and cultural competency across all settings, whether in-person or online. The complexity of each crisis (COVID-19, the economic downtown and social unrest) during the last year directly affected everyone in the campus community. Future challenges will further expose equity gaps if DEI efforts are not routinely practiced.

CONCLUSION

Although the pandemic created positive influences on virtual innovation, it accentuated the equity gap that exists in the healthcare system and higher education institutions. The racial reckoning and COVID disparities experienced by BIPOC populations presented an opportune time to refocus on DEI approaches in health professions education. Health professions educators play a unique role in serving as change agents for future healthcare professionals who have a direct impact on health outcomes. The World Health Organization describes this role as the social accountability of health professions schools (as cited in Simone et al., 2018). Identifying DEI as a core principle, implementing strategic priorities, and allocating resources are necessary action steps for creating an inclusive campus. To achieve an inclusive learning environment DEI must permeate the entire campus community and requires a commitment from the board of trustees, to senior leaders, faculty, employees, and students. A commitment from leadership causes a ripple effect to faculty.

Integral to students' retention and transference of knowledge is faculty engagement and flexibility. Additionally, the use of culturally responsive teaching strategies, taking a closer look at the digital divide, and engaging in race dialogues is imperative to confronting racism and ensuring inclusiveness in the learning environment. Coupled with the US population becoming more diverse, it is also important to prepare future health professionals to work with diverse populations and advocate for health equity. In a virtual environment, practicing cultural sensitivity is important, and faculty must take the time to understand and embrace the intersection of students' identities. The pandemic has created challenging times for everyone, the student, faculty member, and administrator. As adjustments are made for the new normal, it is important to utilize a "humans first approach" (Nasr, 2020 p. 170). Be sure to connect with students, be sensitive to their needs in the virtual classroom, and create learning experiences which promote cultural awareness.

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KEY TERMS AND DEFINITIONS

Biopsychosocial: Integrating biological, psychological, and social contexts.

Culturally Responsive Teaching: A pedagogy that lays emphasis on the importance of including cultural attributes in all aspects of learning.

Diversity: Understanding and recognizing differences in people. This extends to race/ethnicity, gender identity, sexual orientation, socioeconomic status, nationality, religion, ability, and age.

Equity: Fair practices and policies that allow all students to have an opportunity at success.

Implicit Bias: Unconscious attitudes and stereotypes towards a person or population.

Inclusion: The practice of providing a safe space and including resources and opportunities for all (especially for those who are marginalized).

Intersectionality: A framework for understanding how the interrelation of identities (such as race, ethnicity, gender identity, sexual orientation, socioeconomic status, nationality, religion, ability, and age) can overlap.

Social Determinants of Health: The environment in which one lives, works, and goes to school is a greater determinant of their health status.

Student Engagement: Students are attentive, interested and engaged in class lectures, discussions, and activities.

Symbolic Curriculum: Serves as a supplement to convey representation of content in various ways. Examples include storyboards, images, celebrations of diverse cultures.

Chapter 2
Interprofessional Education:
Using Standardized Cases in Face-to-Face and Remote Learning Settings

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ABSTRACT

Interprofessional education (IPE) has emerged as a core educational method among human service and medical educational settings. Research suggests that learners who learn in IPE settings have better transdisciplinary communication skills and are better team members. Unfortunately, competing demands of multiple academic divisions can make facilitating IPE cumbersome. This chapter will describe the processes for developing, implementing, and evaluating an IPE experience drawn from de-identified patient records. The model includes information about incorporating learners from medicine, pharmacy, psychology, social work, and law, but could easily be expanded to include learners from other disciplines. The authors include descriptions of the process of implementing the unfolding case series in both face-to-face and live remote settings. This will include a sample case vignette, a pre-/post-survey, and learning objectives. Finally, the authors include opportunities for expansion and discussion of the challenges of implementing a curriculum targeted toward learners from diverse disciplines.

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INTRODUCTION

Interprofessional education (IPE) has long been considered to be a hallmark of high-quality healthcare education. Training programs in a variety of healthcare disciplines have developed IPE activities as a way to provide richer, more authentic and meaningful clinical training. These programs produce graduates that are well-prepared to work in interdisciplinary settings to provide team-based care that meets the needs of patients. The restrictions on face-to-face activities that were brought about by the COVID-19 pandemic, however, made many of these types of educational experiences almost impossible to implement, at least in their traditional iteration.

This chapter is intended to serve as one example of the development, implementation, and evaluation of a clinical, interprofessional educational (IPE) activity. The authors describe the clinical learning environment and provide background information to paint a picture of the setting from which the impetus for the project arose. They then provide a detailed description of the way that the activity is administered, including a sample case vignette and evaluation questions. Discussion continues with an overview of limitations that were imposed in the wake of the COVID-19 pandemic that ravaged the world during 2020, subsequent effects on the IPE learning activity, and ways that the authors redesigned the IPE activity in order to keep all participants safe, but still maintain the fidelity and original educational objectives. The authors describe some of the many challenges and barriers to implementation that they encountered and provide information about their steps to overcome them. The chapter concludes with a brief description of the clinical learner participants' evaluations of the activity, as well as a discussion of possible steps to expand and enhance it in the future.

BACKGROUND

The World Health Organization (WHO) issued its first report recognizing the importance of interprofessional education (IPE) in health and social care curricula in 1978 (World Health Organization [WHO], 1978). In 2010, the WHO released its Framework for Action on Interprofessional Education & Collaborative Practice, in which it refers to IPE as a 'necessary step' in preparing a healthcare workforce to meet the needs of a constituency (WHO, 2010). Educators from a variety of healthcare and healthcare related disciplines have developed models of IPE. Additionally, a body of research has developed suggesting that IPE can be an effective strategy for developing professionals who provide more effective care and achieve higher patient satisfaction in settings as diverse as emergency departments, operating rooms, diabetes care and management, and mental health care (Reeves et al., n.d.).

In light of the growing understanding of the importance of IPE as a teaching modality, educational governing bodies from healthcare disciplines have developed competencies for interprofessional learning and practice as curricular components. Further, the American Association of Colleges of Nursing, American Association of Osteopathic Medicine, Association of Schools of Public Health, American Association of Colleges of Pharmacy, American Dental Education Association, and the Association of American Medical Colleges have collaboratively released a comprehensive set of competencies for interprofessional practice, highlighting the importance of interprofessional care – and the teaching of interprofessional care – as a core means of achieving high quality patient care (Interprofessional Education Collaborative, 2011).

Different professions have different standards, expectations and requirements related to interprofessional education. Table 1 provides examples from five sample disciplines. Interprofessional education may be delivered in a variety of methods to best meet goals and objectives of IPE, the needs of learners and the availability of time and resources for learners, faculty and institutions. Delivery methods may include but are not limited to didactic courses, simulations, case studies either in person or web-based, clinical experiences, service-learning experiences, student-led clinics, and conferences. Since the pandemic, there have been several case reports and descriptive papers published regarding virtual experiences with remote didactics (synchronous and asynchronous), remote patient visits, virtual case simulations, remote case discussions, and virtual workshops (Jones et al., 2020; Kent et al., 2020; Prasad et al., 2020; Robertson et al., 2021; Romito et al., 2020; Winship et al., 2020). The current literature on pandemic experiences has very limited data; however, the data that are reported support the finding that virtual, remote experiences can be helpful in delivering a meaningful interprofessional experience when other options for IPE are not viable or available (Jones et al., 2020, Kent et al., 2020, Robertson et al., 2021, Romito et al., 2020).

Despite the acknowledged importance of IPE, there remain barriers to the development and implementation of effective and meaningful IPE curricula even before a pandemic added to the complexity. A 2018 study by Homeyer et al. reveals that coordination of curricula between medical and nursing programs can hinder IPE (2018). In 2016, a large study by West et al. found that medical schools struggled to develop and implement IPE curricular programming because of scheduling challenges and inadequate financial resources for those activities (2016). In support of the current project, a paper by Kramer-Jackman et al., finds that online delivery of IPE content may be an effective means of navigating some of the challenges that educational institutions face, but is as yet understudied (2017).

HISTORY AND EVOLUTION OF THE MODEL

Development

The authors' geriatrics clinic was developed to be an interprofessional model, including faculty and learners from four disciplines on a regular basis (medicine, pharmacy, psychology, and social work) as well as clinic nursing staff. It is based at a large research university in the southern United States and was established in 2012 with a primary goal to provide high quality, holistic patient care to an underserved geriatric population across the region. Given that the clinic is part of the clinical education mission of the college, which hosts medical students and a large Family Medicine residency program, a very close secondary goal of the clinic is to provide interprofessional learning opportunities in direct patient care for the multiple learners rotating through the clinic. While the core disciplines of medicine, pharmacy, social work, and psychology have been present since the inception of the clinic, other learners (law, nutrition, medical anthropology) have joined intermittently both in direct patient care as well as in case discussion outside the clinical encounter.

Table 1. Interprofessional education standards, expectations, and requirements by discipline (AACN 2021; ABA 2020; ACGME 2020; ACPE 2015; APA 2019; CSWE 2015)

Discipline and Accrediting Body	Interprofessional Education Standards, Expectations, and Requirements
Family Medicine Residency- Accreditation Council for Graduate Medical Education	"Teamwork- Residents must care for patients in an environment that maximizes communication. This must include the opportunity to work as a member of effective interprofessional teams that are appropriate to the delivery of care in the specialty and larger health system." (ACGME, p. 55)
Law- American Bar Association	Current- there are no standards related to IPE
Pharmacy- Accreditation Council for Pharmacy Education	"Standard 11: Interprofessional Education (IPE) The curriculum prepares all students to provide entry-level, patient-centered care in a variety of practice settings as a contributing member of an interprofessional team. In the aggregate, team exposure includes prescribers as well as other healthcare professionals. Key Elements: 11.1. Interprofessional team dynamics – All students demonstrate competence in interprofessional team dynamics, including articulating the values and ethics that underpin interprofessional practice, engaging in effective interprofessional communication, including conflict resolution and documentation skills, and honoring interprofessional roles and responsibilities. Interprofessional team dynamics are 3 A professional degree program in an institution that meets the definition of and has an institution-wide commitment to "cooperative education" (Cooperative Education and Internship Association; http://www.ceiainc.org) may apply to ACPE for a waiver of this requirement. 8 introduced, reinforced, and practiced in the didactic and Introductory Pharmacy Practice Experience (IPPE) components of the curriculum, and competency is demonstrated in Advanced Pharmacy Practice Experience (APPE) practice settings. 11.2. Interprofessional team education – To advance collaboration and quality of patient care, the didactic and experiential curricula include opportunities for students to learn about, from, and with other members of the interprofessional healthcare team. Through interprofessional education activities, students gain an understanding of the abilities, competencies, and scope of practice of team members. Some, but not all, of these educational activities may be simulations. 11.3. Interprofessional team practice – All students competently participate as a healthcare team member in providing direct patient care and engaging in shared therapeutic decision-making. They participate in experiential educational activities with prescribers/student prescribers and other student/professional healthcare team members, including face-to-face interactions that are designed to advance interprofessional team effectiveness" (ACPE, p. 7)
Psychology – American Psychological Association	"Students must demonstrate competence in… consultation and interprofessional/ interdisciplinary skills". "Interns must demonstrate competence in… consultation and interprofessional/ interdisciplinary skills". "The educational activities listed below may occur in an interprofessional context or may make use of existing didactics occurring in the setting if they are appropriate for advanced level training. Educational activities. Clinical activities. Individual supervision." (APA, p. 33)
Social Work- Council on Social Work Education Policy and Accreditation Standards	Current- there are no standards related to IPE but there is commentary on support for IPE."…[s]ocial workers value the importance of interprofessional teamwork and communication in interventions, recognizing that beneficial outcomes may require interdisciplinary, interprofessional, and inter-organizational collaboration." (CSWE, p. 9) Proposed draft 2022 standards do include IPE
Nursing- American Association of Colleges of Nursing	"Domain 6: Interprofessional Partnerships Descriptor: Intentional collaboration across professions and with care team members, patients, families, communities, and other stakeholders to optimize care, enhance the healthcare experience, and strengthen outcomes." (AACN, p. 46)

A primary goal of the clinic structure is to optimize the time patients spend with interprofessional team members, both being mindful of patients' time and maximizing the use of limited clinical space (exam rooms). To optimize patient flow, team members see patients either alone or in small interprofessional groups and provide brief verbal handoffs to the next member(s) of the care team. This means that not all members of the care team may hear the complete plan because they may be involved with the care of another patient at the time that the plan is developed. Although interprofessional collaboration to provide real-time, comprehensive patient care is the ultimate clinic goal and appears to be achieved, clinical faculty members were concerned that the clinic structure was limiting learners' opportunities to work as a team, to learn from, with, and about each other, and to develop comprehensive care plans for complex patients from start to finish. The clinic is maintained to provide multi-faceted care for patients and onsite interprofessional clinical collaboration for learners, but the need to set aside dedicated time within the clinical rotations to cultivate interprofessional learning about complex patients and about other disciplines became apparent. Thus, the idea arose to implement a monthly case discussion of de-identified, complex, real-life patients from the patient panel.

Face-to-Face Implementation

The case discussion model that was in place prior to the onset of the COVID-19 pandemic had been developed and refined over the course of several years and included a set of objectives that were intended to be applicable to clinical learners across all participating disciplines and irrespective of their level of training.

Objectives for Case Discussion

1. Each clinical learner will analyze a patient case to identify pertinent information needed to develop an assessment and plan from the perspective of the learner's discipline.
2. Each clinical learner will develop an assessment and make recommendations based on his/her own expertise by considering patient specific characteristics and information within the case.
3. Each clinical learner will articulate recommendations and rationale in a clear, respectful manner to the other members of the interprofessional team.
4. All clinical learners will listen respectfully to the other members of the interprofessional team.
5. All clinical learners will contemplate other disciplines' recommendations and consider how they are similar to and different than their own.
6. Clinical learners will respectfully ask for clarification or additional information when an interprofessional team member provides information or recommendations.
7. All clinical learners will work collaboratively as a team to develop care plans for the identified patient.

Learners

Learners involved in the case sessions originally hailed from the core disciplines that are present in the interprofessional geriatrics clinic due to their familiarity with the clinic proceedings and patient care; however, as the model has grown, learners from additional disciplines have joined the sessions based on their availability and interest. Learners from nutrition and anthropology have joined occasionally, and students from elder law classes have become a regular presence in the sessions, despite their limited presence in the geriatrics clinic. Learners and faculty facilitators for the case were drawn from the primary university and from another large state university which houses a school of pharmacy, with the former providing faculty from myriad academic divisions in medical education, social work, psychology, and law. This breadth of clinical and academic experience has resulted in robust conversations and diverse, sometimes divergent, care plan suggestions for the case patients under discussion. However, the logistics that come with such a broad spectrum of participants has also introduced unique challenges for scheduling and implementing the series, as well as developing a common language among participant learners.

Learners involved in the cases are at different stages in their respective curricula. Family medicine residents are typically in their first postgraduate year (PGY-1, also known as interns) and are completing a four-week rotation. Geriatric medicine fellows (fourth year, or PGY-4) rotate longitudinally in clinic while completing a one-year subspecialty fellowship after graduation from their residency. Medical students are in their 3rd or 4th year of medical school, when they are focusing more on clinical work, and are on a six-week rotation. Law students are in their 2nd or 3rd professional year and are on a semester-long schedule. Nutrition students may be undergraduate or graduate students and are typically on three-week rotations. Psychology students are on clinical rotations for semester-long blocks in their 3rd and 4th years of the Ph.D. program, although these placements may last for multiple consecutive semesters. Pharmacy students rotate for five weeks during the 4th year of their curriculum and pharmacy residents rotate for four weeks during their PGY-1 residency. Social work students may be in their BSW or MSW programs and may be on one- or two-semester placements. Given the variability of learners' schedules, the faculty team made the decision to facilitate case discussion sessions monthly during the second or third week of the family medicine intern rotation, which typically aligns with most of the other learners' rotations. Learners who are on longitudinal or semester rotations may participate in more than one case discussion over the duration of their clinical experiences, but the faculty facilitators rotate cases to reduce redundancy.

Facilitators

Case facilitators are seasoned academic clinicians who are all licensed in their fields in law, medicine, pharmacy, psychology, and social work. All have been involved with the geriatric clinic through direct patient care as well as precepting learners. At least one of the five core faculty members is present for each case facilitation, although there are usually at least three. The team developed a facilitator's key for each case to provide important clinical, social, and psychological information to help learners as they develop their collaborative care plan and in response to anticipated questions that they might ask. If learners fail to request information that is necessary for clinical decision making, the facilitator prompts learners to think through what additional information might be needed. This approach models the clinical inquiry process and develops critical thinking in learners. The guide also includes 'trigger' questions for key points that faculty have prioritized for learner discussion to ensure that these are addressed during the session. Finally, the guide provides the group with the current status of the de-identified patient, including information about the actual care plan that was developed by the clinical team at the time and with information from further visits by the patient.

Case Selection and Development

Seven cases have been developed to date for use in this case discussion series and more are in development. Cases are selected and developed by two academic clinicians (a board-certified geriatrician and a board-certified geriatric pharmacist) who work fulltime in the clinic. Cases are chosen based on complexity (medical, social, legal, and/or psychological), the number of disciplines involved in the care of the case patient, the progression of the case over time, and the case's clinical teaching relevance. After the cases are de-identified, faculty members develop a student copy and facilitator guide with unfolding information and the current patient status for each one. These cases describe patients with complexities in multiple domains, although one domain will typically have more issues than the others. Given the historical predisposition that physicians are the 'leaders' of care teams, a stereotype that this activity is designed to repudiate in order to develop a more interdisciplinary approach, cases in which nonmedical issues are more pressing are targeted so that learners can experience a scenario in which the leader of the care team is not the physician. Cases are rotated throughout the year and selected for a session based on the learners and disciplines participating in each session, in light of the previously discussed clinical learner schedules and to allow some learners to participate multiple times without repetition of cases.

Logistics of Face-to-Face Facilitation

One to four learners each from at least three of the identified disciplines attend monthly case discussions that last approximately one hour. Facilitators reserve a room of sufficient size to allow the group to meet comfortably and to allow multiple learners from individual disciplines to discuss their views of the case together. The facilitators notify the clinical learners at least one week in advance of their participation in the discussion, but provide them with no information about the process or the case. This is to ensure that all clinical learners process the same information together, without the benefit of working up a care plan in advance. As the cases are presented as a 'new patient' presenting for the first time to the clinic, the presentation of information at the beginning of the session can help simulate the experience and can allow the students to draw on their skills in their discipline as they would in a real clinical setting. All of the learners are provided with the same instructions at the start of the session:

Task 1: Please review the information on the case vignette as a practitioner in your specialty who is evaluating this patient. What additional information would you like? What additional tests or assessments would you perform and why? Be prepared to present your thoughts on your plan of care regarding the patient (in 5 minutes or less).

Task 2: After all members of the interdisciplinary team have given their input, you will be asked together to come up with an integrated plan of care for the patient, in both the short and long terms.

Learners are given approximately ten minutes to independently develop their thoughts, assessments, and individual plans from their disciplines' perspectives to share. They are also encouraged to discuss quietly with other learners from their same discipline. During this time, learners might also ask clarifying questions to the group at large, including faculty members. After this time, a facilitator asks for a volunteer in the group to provide their thoughts and plan for the case. If no one volunteers, the facilitator calls on someone (usually not someone from medicine) until every discipline in the group has spoken. Faculty facilitators encourage learners to ask questions of other members of the group and assist by asking questions to the full group or individual participants as appropriate. Facilitators ask learners to be mindful of the variety of disciplines in the room and to avoid using discipline-specific jargon and abbreviations. When this is unavoidable, a facilitator asks the learner to describe terminology with which others might not be familiar. Additionally, facilitators prompt learners to explain their thought processes and case suggestions in order to serve in a peer teacher role with the other learners.

After all disciplines' perspectives have been given, the learners work as a team and request additional information to develop a comprehensive care plan. Once this initial care plan is completed collaboratively, the facilitator provides additional information (as available) to the team, which the learners then use collaboratively to modify the care plan as appropriate. They may also ask additional questions of the facilitator(s) at this time. Frequently, the relative importance of different disciplines waxes and wanes as the case unfolds, allowing the learners to experience the processes of taking leadership of the case when necessary and relinquishing it when appropriate. At the conclusion of the exercise, the facilitator elicits verbal and anonymous written feedback from learners about the case and about their thoughts on the experience itself.

Pandemic Restrictions

The sudden onset of the COVID-19 pandemic and the concurrent limitations it brought caught clinical and educational enterprises around the world by surprise. At the clinical site for the current project, administration shifted the focus of clinical operations to address the care of the surge of COVID patients in the clinics and in the organization's partner hospital, while continuing to meet the needs of non-COVID patients either in person or via telemedicine. Medical faculty, residents, and fellows increased their clinical roles as they assumed on-call responsibilities to support patient surges. For faculty members from other disciplines, teaching was shifted to completely remote to decrease risk of exposure and to minimize the spread of the virus. The university campus was closed to most students and to nonessential faculty and staff for approximately five months. When it reopened with the start of the 2020 fall semester, there were strict limitations for meeting size and length. Most faculty were relegated to off-campus operations when the campus closed in March and were encouraged to limit on-campus teaching as much as possible in the fall. All faculty and staff were advised to be on campus only when it was necessary. Campus-based frontline healthcare workers remained on campus, but had ever shifting responsibilities and schedules and diminished nonclinical time due to the needs and demands of providing direct patient care in hospitals and clinics, as well as covering for quarantined colleagues. In addition, many faculty members were faced with the need to provide care for their children who were suddenly having to attend school remotely or whose daycare facilities were temporarily closed. These challenges all culminated in an incredibly complicated new landscape in which to plan and facilitate an IPE activity.

In light of the social distancing requirements imposed by the pandemic, the teaching team quickly decided to adapt the model to an online communication platform. Both of the identified institutions, like most others in the US, had adopted Zoom® as the officially supported platform for most situations (Zoom Video Connections, Inc, 2020). However, different learners and facilitators had different permissions for their Zoom accounts, given that some needed to be HIPAA compliant for telemedicine visits. This would negatively affect the ability to record sessions and limit some breakout room functionality. Because the IPE sessions would now be remote, the teaching team had to consider logistically 1) how and when to distribute the case in order to maintain fidelity to the original model, 2) how and whom to put in breakout rooms together, 3) how and what to use as a white board when the group was highlighting important points or otherwise furthering the discussion of the case, and 4) how and when to distribute pre/post evaluations to the session participants in order to have a meaningful response rate. Ultimately, though, the most challenging question for all members of the team was how to engage learners from multiple disciplines, given that they have not had the opportunity to work with or even meet each other and are isolated at home. This, after all, is the crux of the entire project.

The changes in clinical and scholarly responsibilities also meant that finding a common time was now more challenging. Although the flexibility afforded by remote communication platforms offers some benefits, the combination of faculty and learners in different time zones and rapidly changing responsibilities for all involved meant that finding an available block of time for all participants was as challenging as ever. The initial shock of pandemic restrictions due to increased patient care needs at the hospitals and clinics, changes in personal lives related to quarantine including working remotely, home schooling and full time childcare, along with the timely and necessary revamping of previous in person courses to online courses during Fall semester resulted in a seven-month pause in the monthly IPE opportunity.

Remote Learning Adaptations

The Experience

One member of the faculty facilitation team assumes primary responsibility for managing the technological and scheduling components of the IPE sessions. That faculty member sends participant learners and faculty members a meeting link as an Outlook appointment at least one week in advance of the session date. Faculty members from each of the represented disciplines then send the anonymous link for the Qualtrics® Interprofessional Collaborative Competency Attainment Survey (ICCAS) pre-assessment to the learners from that discipline (MacDonald et al., 2016). Sending this survey directly from a faculty member to that faculty member's own learners was an intentional decision intended to increase student participant response rates. One faculty member then sends the ICCAS and open-ended questions post-assessment to all student participants during the last few minutes of the live session. Faculty facilitators encourage student participants to complete the post-assessment by the end of the day.

During the opening moments of the IPE sessions, in both the face-to-face and remote delivery models, all of the faculty and student participants introduce themselves and state their professional disciplines. In order to retain the fidelity of the in vivo learning sessions, one faculty member sends the case scenario to all of the student and faculty participants while these introductions are taking place. All student participants are encouraged to change their Zoom names to show only their first names and their disciplines (e.g., Michelle, Pharm) so that all participants can appreciate the perspectives of disciplines other than their own. The faculty scheduler then assigns learners to discipline-specific breakout rooms so that they can discuss the case and develop their own responses. This portion of the IPE session lasts for ten minutes, which mirrors the schedule of the face-to-face delivery model. At the end of that time, all of the breakout rooms are closed, bringing the learners all back together simultaneously. At this point, one faculty member facilitates discussion while another uses a Word document screen shared with the group as a white board to capture the pertinent thoughts and questions as presented by learners from each discipline. As with the breakout rooms, this process mirrors the in vivo delivery model.

Assessment/Feedback

Faculty use the validated ICCAS, one six-point Likert scale question regarding educational value of the IPE session as well as several open-ended questions (e.g., "What was most educational about the interprofessional case discussions?" and "What was least educational about the interprofessional case discussions?") to determine learners' perceptions of the IPE case discussion (Table 2). (MacDonald et al., 2016) Facilitators developed these open-ended questions as a pilot to gather learner feedback for this educational endeavor. Learner feedback is completely voluntary and anonymous.

Learner Feedback

Thirty-eight out of forty-one learners who participated in virtual IPE sessions (2020-2021) provided feedback on the post-session survey. Thirty-four (89%) stated that the IPE session was very educational to educational, with one stating somewhat educational and three learners not answering this question at all. There were several themes that emerged when learners were asked what was most educational, least educational, and their recommendations for changes. Table 2 provides these responses. These results were similar to previous learner responses (n=35, 2016-2018) when sessions were offered in person. Thirty (86%) responded sessions were very educational to educational, with four learners stating sessions were somewhat educational and one learner stating the session was significantly lacking in educational benefit. Learner feedback was similar with the exception for in-person session requests. These responses are described in Table 2.

Table 2. Learner feedback themes (virtual and in person)

	Virtual (n=38)		In Person (n=35)	
Survey Question	**Theme and representative context**	**Theme appearance n= (%)**	**Theme and representative context**	**Theme appearance n= (%)**
What was most educational about the interprofessional case discussions?	Knowledge Perceptions Specific Disciplines Resources	16 (42%) 11 (29%) 4 (11%) 2 (5%)	Different approaches based on profession Understanding roles of each profession Collaboration Problem solving	13 (37%) 7 (20%) 6 (17%) 3 (9%)
What was least educational about the interprofessional case discussions?	Nothing Not Applicable Lack of breakout room diversity Virtual session Case details Jargon	8 (21%) 6 (16%) 4 (11%) 3 (8%) 3 (8%) 2 (5%)	Nothing/not applicable Information presented Discipline specific	19 (54%) 2 (6%) 1 (3%)
How would you change the current format to improve the case discussion?	None Increased time In person sessions Not applicable Diversify breakout groups	10 (26%) 4 (11%) 4 (11%) 2 (5%) 3 (8%)	Nothing Increased time for activity and consensus building More structure of information (e.g., information progressively disclosed) Increased diversity of disciplines	12 (34%) 7 (20%) 3 (9%) 2 (6%)

Faculty Perceptions

Overall, faculty believe the virtual case discussion sessions worked well for delivery. It allowed learners dispersed all over the country to engage in discussions still meaningfully with their interprofessional peers. There were only minor modifications to format from in person sessions to virtual sessions, which did not deter from a meaningful experience to learn from, with and about each other.

There were challenges for faculty with these sessions. One big learning curve for faculty was to learn to meaningfully engage and facilitate a session that was entirely virtual. Virtual facilitation requires much more intentionality in introductions for members in the group, describing the session format, setting the session tone, and utilizing intentional, meaningful questions from start to finish in a session to put learners more at ease to engage. Faculty found one of the biggest challenges facilitating a group that may have never worked together clinically. This required much more deliberate engagement compared to live sessions. What faculty found most useful was having a mentor of that specific discipline ask questions to engage learners from their discipline that might be more reserved. Additionally, faculty members learned that virtual sessions ran more smoothly when one team member facilitated and managed technology, connectivity issues, and breakout rooms, while another facilitated electronic case distribution, surveys, and note keeping on the white board, while a third team member facilitated the session and prompted the discussion from start to finish.

SOLUTIONS AND RECOMMENDATIONS

Virtual delivery of this IPE activity brought several challenges. As mentioned previously, simply scheduling the block of time was one of the most onerous struggles. The scheduling difficulty for face-to-face sessions is frequently finding an available room; by contrast, virtual delivery eliminated that obstacle, but the fluidity and variability of schedules of everyone involved made simply finding a common available hour-long block of time quite difficult. Previously stated challenges of work, school, and home schedules, as well as multiple time zones, meant that scheduling became somewhat like a game of whack-a-mole. One of the consequences of this was that the student participants in the IPE sessions were sometimes changed at the last minute and/or the available faculty facilitators might be different than had originally been planned; however, the facilitators always ensured that learners from at least three disciplines were represented. In situations when this was not possible, facilitators simply rescheduled the session. As schedules are slowly becoming more predictable with COVID restrictions being lifted in all aspects of life, it is allowing faculty to coordinate calendars to schedule IPE sessions more in advance.

The reliance upon technology and technological infrastructure also proved problematic. Unpredictable factors, including software updates, power outages, weather events (such as thunderstorms and hurricanes), structural issues (the main building with network connections sustaining a major flood with significant IT disruption), connectivity and Wi-Fi problems, and platform disruptions left learners and facilitators struggling to connect. Breakout rooms did not always work properly due to communication barriers between different versions of the communication platform. Additionally, participants who had multiple simultaneous screens were able to see the activity documents and the rest of the participants at the same time, but those who did not have multiple screens were not able to do so. Many of the technological issues were beyond the control of either the faculty facilitators or the learners. Because of the unforeseeable nature of most of these challenges, all participants learned to be flexible and adaptable. Students adjusted well to technical challenges with the virtual platforms, often trying to help trouble shoot for both peers and faculty. Faculty members often stepped in to fill another faculty member's role when a problem arose. As we can get back on campus, Wi-Fi access should be more reliable, computer lab access should be more available, and meeting platforms will only be improved/enhanced with time. All of this will help us offer a better virtual experience for learners and faculty alike.

Facilitators noticed that learner participants in remote IPE sessions were frequently more reticent to talk, leaving the facilitators with the challenge to prompt discussion. This might be attributable to the fact that most of the learners in the remote configurations had never actually met, much less worked with, their fellow learners; additionally, because everyone was attending remotely, the normal side-to-side banter between learners of the same discipline was also gone. Although it did not completely mitigate the issue, the practice of self-identifying by name and discipline on each participant's Zoom® profile did appear to minimize some of the hesitancy to participate. Another, more active approach that faculty members employed to facilitate discussion was asking learner participants to explain terminology that might be unfamiliar to other members of the group. Furthermore, learners also appeared to be more likely to speak up if one of the faculty members on the session was from their same discipline (e.g., students from social work were more likely to speak in the presence of a social work faculty member). This might be due to a sense of comfort provided by a faculty member from one's own discipline or it might also arise out of a student's desire to impress a faculty member. With faculty having increased experiences facilitating IPE case sessions virtually, virtual sessions will only improve for learners. In addition, other platforms may be available and more engaging, make for easier collaboration for both learners and faculty.

Despite innumerable challenges, virtual IPE sessions resulted in numerous successes. For example, 89% of learners who responded to the post-survey reported they found these sessions to be educational to very educational. When asked what learners found most educational, they reported that hearing the knowledge of multiple disciplines and perspectives from other disciplines, as well as resources available were most educational. This is consistent with what in-person learners reported for IPE sessions previously. Additionally, although many learners expressed that they understood that virtual delivery was the best option for these IPE sessions during the pandemic, 11% did report they would prefer in person sessions if it could be changed. Pre and post survey response rates were relatively high (100% and 93%), particularly in light of the electronic nature of distribution. Response rates for face-to-face IPE sessions with paper surveys had not yielded desired response rates (less than 50%). Distribution of the pre-survey by facilitators to their own learners was likely most helpful in pre-survey response rates and immediate distribution of post-surveys before the session ended likely help to improve post-survey response rates.

Our sessions could be adapted in a variety of settings where interprofessional patient care occurs (hospital, long term care facilities, etc.) to augment learning and teamwork. While we focused on the care of a complex older adult presenting as an ambulatory patient to the clinic, cases could be identified that require interprofessional care of a complex obstetric or a pediatric patient presenting to a different health care environment or several patients presenting to an emergency room needing high level care given the severity of their problems. One aspect of the cases that was beneficial to the facilitators were that they are de-identified real patients that the clinicians knew well: this allowed the facilitators to expound on nuances of care that came up in the case discussions. Adaptation of the cases to other settings would be possible but may work better if facilitators were very familiar with their specific cases in order to address novel questions that might arise from a diverse learner pool.

One of the biggest advantages for virtual sessions was we no longer needed a space for a large group of interprofessional learners to meet. In addition, utilizing virtual meeting sessions allowed us to include faculty and learners in our sessions regardless of geographic location, which ultimately allowed more individuals to participate. However, going virtual was one of the biggest disadvantages from the learners' points of view based on survey feedback. Learners acknowledged it was necessary given social distancing requirements, but several voiced they would prefer in person sessions when possible. In the future, we may consider offering hybrid sessions to allow learners and faculty who can and want to be present in person to do so but also allow others who prefer or who can only connect virtually to do that in the same session.

FUTURE RESEARCH DIRECTIONS

The post-pandemic world is not the same as the pre-pandemic world. Many educational activities that had previously only been offered in traditional, face-to-face settings are now offered via virtual platforms or in hybrid models that include a group of learners who are face-to-face and who are interacting with other learners remotely. This affords opportunities for research with healthcare learners from training programs that may be in different parts of the United States, or even in different countries where healthcare may be delivered in a very different manner. Additionally, as the technology becomes more ubiquitous, the research team will be able to consider adding participants from other types of learners not previously considered (e.g., medical ethics, healthcare management). The ability to expand the model in ways like this could, in turn, allow for the development of other questions for the learners (e.g., "What elements of the healthcare or social system facilitated or inhibited the care of this patient?").

CONCLUSION

The merits of IPE for learners and patients are well-established and garnering more attention. Credentialing bodies and educational institutions representing most health and social care disciplines have infused IPE activities aimed at inculcating the basic tenets of IPE as key curricular components. Despite this impetus of activity, barriers to consistent implementation remain. The restrictions imposed by the SARS-CoV-19 pandemic that began in 2020 brought with them both additional challenges for IPE and opportunities to overcome them. The ubiquitous presence of remote communications platforms, coupled with the directive from educational institutions to develop methods to deliver educational content and activities remotely has resulted in new methods of doing what many had previously thought undoable – providing meaningful, interactive learning opportunities in a virtual platform in a manner that obtains toward the goals of IPE and learning competencies across myriad disciplines.

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KEY TERMS AND DEFINITIONS

Breakout Rooms: Use of a group communication technology platform to place learners in small groups.

Complex Patient: A patient who presents with multiple complicating issues, specifically from medical, social, psychological, or legal domains.

Geriatric: Regarding a patient or the care of a patient who is 60 years old or older.

Interprofessional Collaborative Competencies Attainment Survey (ICCAS): A validated assessment tool used pre- and post- IPE sessions to assess changes in learners' attitudes and opinions about collaborative patient care.

Remote Teaching: Teaching synchronous learners from distance locations via a communications platform.

Virtual: Use of a group communication technology platform to bring together a group of facilitators and learners for an educational experience.

Whack-a-Mole: A colloquialism stemming from a Japanese arcade game and frequently used in the field of computer programming that refers to the process of finding a solution to a problem, only to find another problem popping up somewhere else.

APPENDIX 1

Example Case Vignette (Edits made by the authors in order to clarify the case for an external audience are presented in italics and parentheses)

Patient JB – Initial Presentation

Patient: JB is a 59yo male presenting to the clinic in July as a new patient with chief complaint of "follow-up chest pain." Patient had been seen in the ED (Emergency Department) two weeks prior to the appointment with complaint of chest pain following an altercation with his son. He was ruled out for cardiac causes of chest pain, and his pain was thought to be due to a panic attack. Mr. B has had a history of panic attacks in the past, as well as some depression and chronic pain from a motorcycle accident and subsequent multiple back surgeries, but was taken off all psychiatric and pain meds (Klonopin, Norco, Prozac) in May by his previous doctor who said they were unnecessary. He reports some considerable back and lower extremity pain at this time but is more concerned with his chest pain and his current thoughts. Patient is having suicidal thoughts prior to the office visit: he has thoughts of killing himself via hanging. Patient also having family issues regarding ownership of some land and son is keeping patient from seeing his grandson who he is very close with. He reports no other concerns at this time but does not attend well to the interview (head hanging, no eye contact). He reports "I'm worried about what I might do to myself and my family and I want to get better."

PMH (past medical history): diabetes, hypertension, hyperlipidemia, possible history of depression and anxiety, status post motorcycle accident 2000 with significant lower extremity neuropathy/back pain.

Medications on presentation: patient brings a list with the following medications on it: atenolol/chlorthalidone 50/25 daily, pravastatin 40 daily, aspirin 81 daily, metformin 1000 bid, glipizide10 tid, Norvasc 10 daily (in ED: Klonopin 1mg tid, Lortab 7.5/500 4 times a day started 2 weeks prior to clinic visit). (*Author's note: some abbreviations such as BID/TID and doses are left in the case so that clinical learners can use these as ways to explain their meaning to other learners and thus facilitate the role of "learner as teacher of their discipline")*

Allergies: none
Social: rare alcohol, positive tobacco use 1.5 packs a day, occasional marijuana to help with back pain, no other illicit medications
Physical exam: VS weight 219.4 (reported weight gain), BP 135/87, HR 87, Temp 98.2, 02 96%

Poor hygiene, very poor eye contact and slow responses. Poor dentition, moderately impaired short-term memory. Smells of cigarette smoke. Limited ROM of the lumbar spine. Other physical exam findings within normal limits.

Task 1: Please review the information above as a practitioner in your specialty who has been asked to evaluate this patient. What additional information would you like? What additional tests would you like to perform and why? Please be prepared to present your thoughts on this patient and what your plan is regarding the patient plan of care (in 5 minutes or less).
Task 2: After all members of the interdisciplinary team have given their input, you will be asked together to come up with an integrated plan of care and management for the patient, both short and long term.

APPENDIX 2

Patient JB – Facilitator Copy

If learners ask for various tests, these are the results to can share with them for this initial encounter:

SLUMS (*St Louis University Mental Status exam*) score of 20/30: have a learner describe to the team what this means (*scale for cognitive impairment: 20/30 implies mild to moderate dementia)*
GDS (*Geriatric Depression Scale)* score of 14/15: have a learner describe to the team what this means (*scale for depression: a score over 5 is clinically significant for depression with higher scores worse)*
GAI (*Geriatric Anxiety Inventory)* score of 5/5: have a learner describe to the team what this means (*scale for anxiety: any positive score is clinically significant for anxiety with higher scores worse)*

If blood work is requested, tell the learners that the patient was reluctant to have labs drawn and "just wanted to get home and get back in bed." He was willing to come back later to have them drawn.

If the question is asked about the patient's medications, state that he has brought a list of the medications listed above, but the only bottles that he brought were those that were given to him in the ED (Klonopin and Lortab). He has appropriate numbers of pills in those bottles showing that he is not taking extra. When asked about the other medications, he says that he takes them sometimes, but sometimes he forgets. He doesn't know how many refills he has of those medications. He is not sure what those medications are for.

If the question is asked about this patient's imminent risk for suicide, say that extensive questioning revealed that the patient is having active thoughts of self-harm, but that he has removed all means of doing so from his home (ropes, cords, etc.) and is willing to complete a contract for safety on an outpatient basis. He appears to be a reliable self-reporter. He is amenable to any form of treatment that would help him at the moment.

Questions to guide the learners based on their case formulation: they may bring up much of this in their group discussion

1. What are you most concerned about with this patient?
2. What are his most pressing needs?
3. This is a medical clinic. How can we get him what he needs?
4. What should be done for him today?
5. When should follow-up occur?
6. How will you measure success for this patient?
7. How will you build upon the knowledge and skills of your colleagues to help this patient?

Sample Case Plan (*Not part of the written case: provided as an example of what learners might come up with)*:

The patient's most pressing needs are psychiatric, psychological and social right now. He should be assessed to see if he is truly imminently at risk to self, and if so, steps should be taken for inpatient psych hospitalization. If he is reliable and able to contract for safety, then possibly a combination of pharmacotherapy and psychotherapy to start soon with very close follow-up. In addition, use of a social worker or law to help with the property disputes and financial difficulties he is having may alleviate some burden for him. At this time will focus on social and psych issues to stabilize the patient prior to other medical interventions.

Patient JB – Follow-up (*verbally told to the learners from the facilitator)*:

You see JB in follow-up in the next (week, 2 weeks, whatever follow-up time was determined by the group) and he seems to be stable to slightly improved. He is maintaining the plan that you determined together and is no longer actively suicidal. He allows you to draw labs at this time. At this time, he does not bring in his pills. His vital signs show a blood pressure of 158/87, heart rate of 75, temperature of 98.4 and respiratory rate of 14. He still has a flat affect but seems calmer than previous, and shows some faint social smiling.

Questions:

1. What would you like to do now for him? What would you like to maintain or change?
2. When would you like to see him back?

If learners ask about lab work, have them tell you what they would like to order. These are the lab results to give if asked: anything else asked would be within normal limits.

Hemoglobin A1c: 10.4 (have a learner explain that level to the others)
Total cholesterol: 242
HDL: 28
Triglycerides: 452
CMP: all within normal limits except for a glucose of 268
CBC: all within normal limits
Questions for after the learners process lab results or process the most recent update:

1. What are your plans now? How have they changed?
2. How can you use your colleagues to provide complete care for the patient?

After final discussion and wrap-up on the process: update on the patient. He was started on an SSRI medication and intense psychotherapy at the first visit and showed some improvement on the follow-up visit in 1 week. He had bloodwork drawn at that time with the lab results noted. He came back in 2 weeks later and med reconciliation by pharmacy showed he was only taking medications from the ED. Medications were restarted and patient started diabetes education. His A1c improved and through social work intervention he was able to get visitation rights with his grandson which caused him much joy. He followed up every few weeks until he felt comfortable spacing out his appointments. Six months after his initial visit his SLUMS score was 29, his GDS was 5 and his GAI was 1.

Chapter 3
Thriving in the Post-Pandemic Classroom:
Promoting Engagement in Health Professions' Students

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ABSTRACT

This chapter focuses on promoting student engagement in heath profession education. Discussions will include the longstanding issues related to student engagement that were evident before the COVID-19 pandemic, how these issues associated with engagement were magnified during the pandemic, and how these issues have been transformed into new opportunities to enhance student engagement as we collectively enter the post-pandemic era. Elements of wellbeing, resiliency, and motivation, as they relate to engagement, are explored in depth. Strategies to promote student engagement in the future classroom are discussed in addition to considerations for stronger faculty engagement surrounding teaching. Throughout the chapter, the experiences of one school of pharmacy will be described, providing examples of strategies for enhancing engagement in the post-pandemic classroom.

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INTRODUCTION

Teaching and learning in the midst of a pandemic offers a myriad of unique challenges as well as opportunities for schools, faculty, and students. Though coping with change can be challenging, the unexpected disruption brought by the COVID-19 pandemic forced classrooms to alter operations in an extremely condensed period of time. This necessitated acceptance and adaptation of a number of challenges, including requiring quick adjustments to a new virtual learning environment. Coupled with this disruption is a unique opportunity to reframe the problem as a chance to address enduring issues and thrive in a new learning environment.

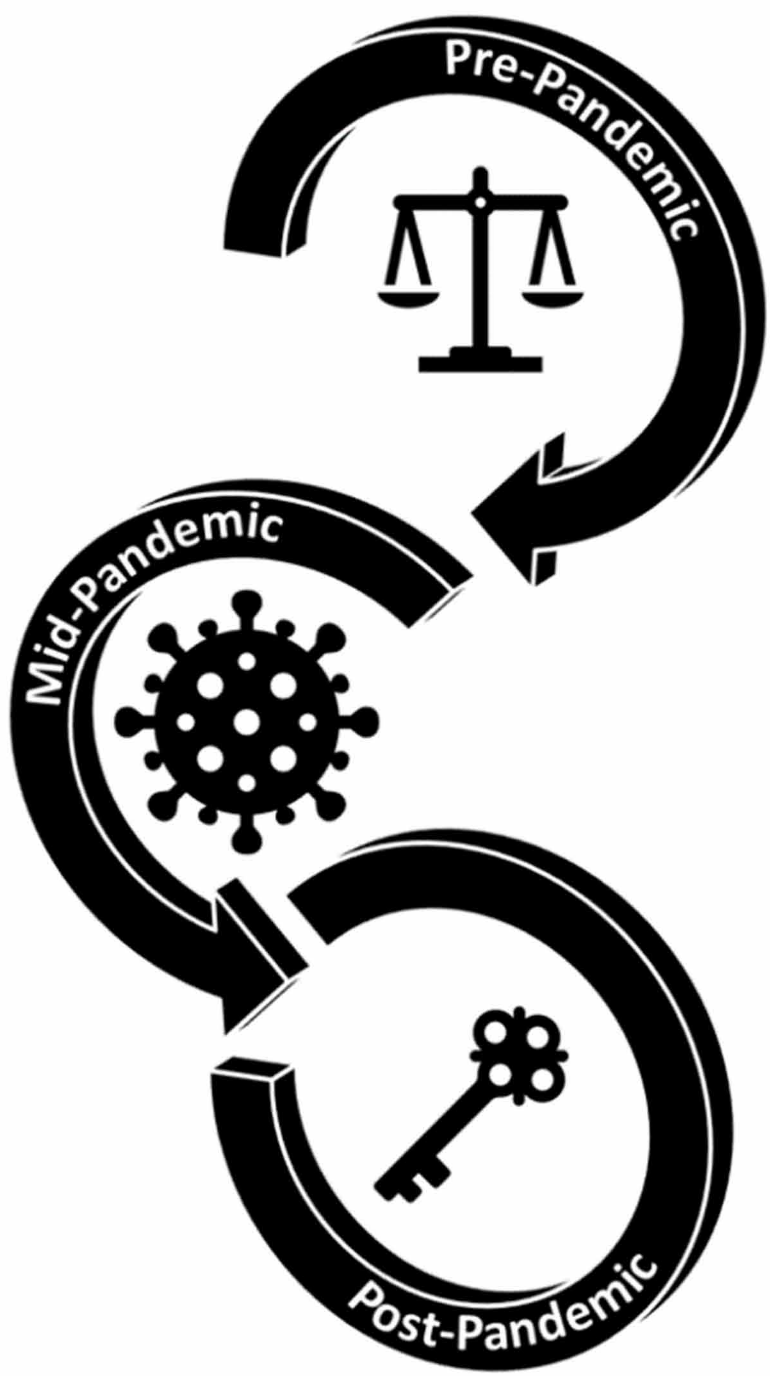
Motivating faculty to embrace innovative pedagogy in order to engage students through the density of a curriculum has been a historic dilemma that has perplexed educators, specifically health professions' educators, for decades (Pelaccia & Viau, 2016). Over the years, health professions education has adopted a variety of new strategies for more authentic instruction, including interprofessional education, integration, active learning, competency-based education and enhanced experiential exercises. However, engaging students in these experiences and encouraging them to be motivated, resilient learners has continued to plague educators, as even highly motivated students such as those in the health professions can resist learning (Tolman & Kremling, 2017). Coupling the historic challenge to engage students in the didactic curriculum with the disruption created by the COVID-19 pandemic further compounds the challenges educators face to engage learners to a significant degree.

The Background section of this chapter will focus on common, historical challenges to student engagement amongst health professions students, emphasizing motivation, wellbeing, and resiliency as mediators of engagement. While there are many theories to explain engagement, no single definition or common organization explaining student engagement exists in the literature. Therefore, for the purposes of this chapter, motivation, wellbeing, and resiliency represent the authors' constructs for engagement. Based on our experiences during the pandemic, these areas are the most significant and relevant ones for professional students and faculty. These identified areas, which influence engagement, will be the primary focus for this chapter.

Living through a traumatic public health crisis, like the COVID-19 pandemic, which took center stage in students' lives, offers opportunities for personal and professional evolution. As a result, this chapter will also highlight and consider how the educational challenges related to engagement (i.e., motivation, wellbeing, and resiliency) might be reframed as opportunities that promote solutions.

We propose the model in Figure 1 as a graphic representation of the set-up of this chapter, which is written chronologically within the context of pre-, mid-, and post-pandemic eras. The linking circles indicate the connection between the phases, yet are distinct to portray the nuances of each distinct era. 'Pre-Pandemic' refers to the established challenges health professions students and faculty have had to balance regarding their influence on engagement. Note the balance in the middle of the pre-pandemic circle. 'Mid-Pandemic' refers to the newly introduced trials of the COVID-19 pandemic, and associated viral transmission as depicted by the viral particle in the center. Finally, 'Post-Pandemic' offers insights into how these challenges, both old and new, can be transformed into opportunities, which is the key mindset to developing, maintaining, and fostering personal and academic wellbeing into the future. This is portrayed by the key in the center. Throughout the chapter, the experience of one School of Pharmacy will be discussed and used to situate possible strategies for the future.

Figure 1.Linking pre- and mid-pandemic challenges to foster post-pandemic opportunities (© 2021, Auburn University Harrison School of Pharmacy)



BACKGROUND

Description of an Integrated Curriculum

Educators at the Auburn University Harrison School of Pharmacy (AUHSOP) have been pioneers in innovating an integrated, competency-driven curriculum over the last decade (Hornsby & Wright, 2020; Wright et al., 2018). In 2017, this curriculum, termed the Practice Ready Curriculum (PRC), was launched. The PRC was initially designed with flexibility in mind, and to be relevant to practice, integrated, and incorporate active learning. The thought was that this intentionality would mitigate some of the long-standing issues related to student motivation and engagement. One reason for this is because AUHSOP is a dual campus, with remote instruction already being delivered to an off-site campus. AUHSOP's competency-driven curriculum was designed by first envisioning the future of pharmacy practice and then employing the principles of backward design (Wiggins & McTighe, 2005) to identify competencies that form the assessment structure of the curriculum. Disease states, prioritized based on the profession, serve as the context through which these competencies are taught and assessed. In order to fully integrate the curriculum, no stand-alone courses such as pharmacology or therapeutics were included. Instead, each semester is composed of two 6-week Integrated Learning Experiences (ILE) structured around disease state contexts; one semester-long, non-disease state specific Longitudinal course focused on themes (Navigating the US Healthcare System, Health and Wellness, Developing and Promoting Pharmacy Services, etc.); and one intensive week-long Workshop course that focuses on one major topic (Immunizations, Drug information resources, etc.).

Due to the integrated design of the PRC, courses at AUHSOP are coordinated by multiple faculty members. Unique to our program is the Curricular Coordinator position. Those in this position are licensed pharmacists dedicated to implementing the day-to-day operations for a specific academic year. There are four Curricular Coordinators at AUHSOP, one for first-year students, second-year students, and third-year students, and one who oversees implementation on the satellite campus for all classes. Because the faculty who teach within the courses only instruct students for a limited period (anywhere from one day to one week, generally), the curriculum designers felt compelled to incorporate a position that maintained a consistent presence in the classroom and to collaborate directly with course coordinators. In addition to overseeing the day-to-day teaching and assessments, the Curricular Coordinators also serve as 'first-line' access points for students. A large component of their role involves student support, which can include areas related to academic, psychological, or personal support.

Despite the design of the PRC, the setup for remote learning, and access to student support personnel, when AUHSOP faced the realities of COVID-19, such as social isolation and extensive virtual learning, student engagement as noted through the lenses of motivation, wellbeing, and resiliency-related issues became more exposed, and thus student engagement was spotlighted as a priority area for educators at the school to explore. Furthering the importance of this issue, which became apparent over time, was that the transition to virtual learning was not temporary and that embracing this modality as part of the 'new normal', while also thriving in it, will create new challenges moving forward.

Student Engagement 'Pre-Pandemic'

Before considering the effects of the COVID-19 pandemic and the opportunities moving forward, it is important to recognize the historical context surrounding student engagement. Student engagement is a complex phenomenon that is defined by various approaches ranging from student agency to institutional structures and cultures, socio-political influences, socio-affective domains, and environmental factors (Kuh et al., 2006; Reschly & Christenson, 2012; Zepke & Leach, 2010). Due to this, student engagement cannot be singularly defined, nor can it be assessed by one assessment strategy (Mandernach, 2015). Therefore, assessment of student engagement must be multi-faceted and represent the context of how the program defines the term. Example assessment approaches include instructor observations, student self-reports, administrative record keeping, and surveys with rating scales (Mandernach, 2015). As Chapman (2003) asserts, student engagement is an active process requiring investment, participation, and a commitment to learning. Because student engagement is critically dependent on personal investment in the learning process, in this chapter we focus on the psychological constructs and interplay of motivation, wellbeing, and resiliency that we have identified are key components of student engagement.

Constructs of Engagement

Motivation is a key component of engagement (Zepke & Leach, 2010). Some scholars even use the terms motivation and engagement interchangeably, as the thought is motivated students are engaged and engaged students are motivated (Reschly & Christenson, 2012). Engaged students are internally motivated to be active, collaborative learners because they want to "exercise their agency" (p. 169). Motivation is built from a positive mindset, realistic optimism, and resiliency (Whitfield et al., 2021). It is the internal willingness to initiate and sustain a goal-directed mindset to overcome a challenge, complete a task, or attempt a new activity (Cook & Artino, 2016). The key concept of motivation is that it is an outcome-oriented process that focuses on the active pursuit of achieving a goal. In a classroom, motivation is first personified by students knowing their goal(s), and then taking steps to actively achieve them. Motivation is influenced by personal characteristics, traits, values, and beliefs, as well as by social factors and experiences (Cook & Artino, 2016). These influences are termed intrapersonal and interpersonal factors, respectively, and they hold a powerful impact on a student's ability to develop and maintain effective levels of motivation (Orsini et al., 2016). Motivation is most commonly represented and interpreted through external means such as actions, characteristics, and achievements. However, it originates as an internal decision. Therefore, one's mindset greatly impacts his or her overall motivation.

Motivation is one predictor of academic success and is therefore an important factor for students (Kuh et al., 2006). Health professions education has shifted its focus towards motivation because of the assumption these students automatically have high levels of motivation (Pelaccia & Viau, 2016). However, this belief holds little validity, as motivation fluctuates in health professions students. This is because motivation is a choice, and oftentimes a learned skillset. Although students' internal motivation to learn originates based on their personal thoughts, feelings, and beliefs, it is still quite vulnerable to external factors. For example, motivation can be directly impacted by the learning environment for which the student is a part (Cook & Artino, 2016). As reported by Cook & Artino (2016), social experiences including life events, influential relationships, and social pressures are other barriers to motivation that may indirectly affect wellbeing and overall academic performance (Orsini et al., 2016). Therefore, motivation in health professions students is not an isolated phenomenon because it is constantly threatened by internal and external influences within a larger social framework. With practice, motivation can be developed, maintained, and improved to promote health professions students' mental and physical health, and academic success (Whitfield et al., 2021).

Poor mental health is a leading offender of mediocre motivation and a consistent barrier to academic success in health professions students. Historically, students have reported difficulties with anxiety and depression, especially when balancing schoolwork, home life, and job responsibilities (Fuller et al., 2020). As we will see in subsequent sections, while these barriers related to mental health were once manageable for many students, the pandemic enhanced this area of concern and created many new sources of anxiety that might further deteriorate mental health (Fuller et al., 2020).

Wellbeing is a popular topic in the literature, as it is positively associated with student engagement (Anderson & Graham, 2016). Wellbeing is, in basic terms, being satisfied with life (Schlesselman et al., 2020). It is the existence of positive emotions and the absence of negative feelings. Facilitating wellbeing in college-aged students is a challenge, as noted by a 2017 study conducted by the National Institute of Mental Health, which found that the highest rates of anxiety and depression were in adults of this age group (Shangraw et al., 2021). Considering students with anxiety and depression lack a strong sense of wellbeing and admittedly have trouble sleeping, focusing, and functioning in school, there is no surprise that engaging students in the learning process has been a longstanding issue compounded by the pandemic (Shangraw et al., 2021).

In addition to mental wellbeing, a lack of physical wellbeing is common in students. Poor physical health is most commonly a result of sleep disturbances, unhealthy eating, and a lack of physical activity. For many health professions students, the academic workload increases in difficulty and quantity over the duration of professional schooling or training, meaning that these students allocate less and less time for relaxation or enjoyable hobbies, adequate hours of sleep, healthy eating, and exercise. This is consistent with an unbalanced lifestyle, which makes it difficult for health professions students to self-regulate and reflect on their physical wellbeing (Whitfield et al., 2021).

The known negative impacts of poor mental and physical health are frequently a result of disruptions to daily routines, which can affect psychological, academic, and social areas. Ultimately, these disturbances impair students' abilities to perform in school effectively and confidently by suppressing their self-motivated desires to succeed. These motivational disparities are also amplified when students are simultaneously attempting to balance other personal challenges, unrelated to motivation and academic excellence.

Maslow's notion of hierarchical needs is a reminder of the importance of student wellbeing within a person's larger scheme of needs. Maslow's Hierarchy of Needs consists of an individual's basic needs (security, safety, wellbeing, etc.), psychological needs (relationships, self-esteem, belonginess, etc.), and self-fulfillment needs (achieving one's full potential). Represented as a pyramidic model, Maslow suggests that an individual must first satisfy their most basic needs before they can fulfill their subsequent psychological and self-fulfillment needs (Maslow, 1987; Schlesselman et al., 2020). Meaning, if needs related to wellbeing are unmet or underdeveloped, students are unlikely to focus on 'less essential' areas such as academics until the more critical, unmet needs are satisfied. This is a reminder for educators on the importance of ensuring basic needs and wellbeing of students are considered and prioritized in the educational realm as fulfilling these basic needs are vital to the learning process (Schlesselman et al., 2020).

Resiliency is the process of adapting to challenges related to adversity, trauma, tragedy, threats, or stress (American Psychological Association, 2012). Coping with the cycles of life's trials over time yields a more resilient mindset. Therefore, it is an important factor to consider alongside engagement because it is needed to overcome challenges or changes, such as failing an exam, which could be perceived as a major threat to a student's educational progression (Chisolm-Burns et al., 2019; Martin, 2013).

Being resilient, or 'shaking off' negative pressures, can be challenging for students given the negative stigmas associated with seeking help for mental health related issues. A 2010 study in medical students found that seeking assistance for mental health conditions carried a perceived assumption of lesser intelligence (Schwenk et al., 2010). Further, 5% of medical students experience suicidal thoughts at some point during their education, while 14% experience moderate to severe depression (Kulig & Persky, 2017). Like wellbeing, these rates are higher than the national average for adults 18 to 25 years of age, a population with frequently high rates of depression (National Institute of Mental Health, 2019).

Student wellbeing and resilience cannot be overlooked when addressing concerns of student engagement and academic performance. Resilience and grit have been found to be predictors of wellbeing and are associated with academic and professional success independent of IQ (Stoffel & Cain, 2018). These attributes have a history of importance in military service and athletic success but are gaining traction in the educational community when gauging how students can handle challenging situations and disappointment. In the university setting, more resilient students can better manage academic pressures than less resilient students (McLafferty et al., 2012).

ENGAGEMENT IN HEALTH PROFESSIONS' STUDENTS

Novel Challenges of Engagement 'Mid-Pandemic'

Overall, the impact of mental health on engagement in the classroom as well as academic successes are complex issues that were present prior to the unprecedented COVID-19 pandemic yet have become amplified as a result of it (Schlesselman et al., 2020; Shangraw et al., 2021). Moreno-Fernandez et al. (2020) suggest that an unexpected or traumatic experience, such as the COVID-19 pandemic, will have a direct and negative impact on the quantity and quality of student engagement. This is not surprising given that educational institutions quickly, and even perhaps haphazardly, adapted their pedagogical methods in order to promote safety amongst their students and faculty. This ultimately led to swift and significant adjustments to virtual learning and decreased physical person-to-person interactions (Medina et al., 2020). The shift from on-campus learning to the use of virtual classrooms unveiled new barriers for learning and exacerbated preexisting concerns for educators such as student engagement (van Rooij et al., 2017). The transition from on-campus instruction to remote learning presented some students with new hurdles not encountered previously in their educational experiences, such as time zone differences for those that relocated during quarantine periods, or evolving classroom or assessment schedules. As institutions identified and implemented methods to best meet their educational goals in light of the swift transition to virtual learning, a sense of resiliency and adaptability were critical characteristics that emerged. Not only were academic changes widespread and swift, but required quarantines and social distancing measures added additional anxiety and affected living situations. Overcoming these rapid changes and mounting burdens challenged the notion of resilience among educators and students.

Issues like anxiety, depression, and even social isolation were problems before the pandemic, affecting academic performance among learners. However, due to the pandemic and the gripping changes it necessitated, these psychological issues were compounded, especially among students who were emotionally susceptible beforehand (Xiong et al., 2020) or who had significant fears of contracting and dying from the virus despite no prior mental health conditions (Cable, 2020). This impact on wellbeing and ultimately engagement in the classroom cannot be understated and will likely be an area of exploration for years to come.

Effects of Social Isolation

Social relationships are known to be crucial for wellbeing (Mushtaq et al., 2014), considering social networks and contacts with those in one's network are essential in preventing distress and poor mental health (Cable, 2020). Social interactions also play a role in facilitating student success as students learn to navigate unfamiliar environments (Kuh et al., 2006). Social isolation, or the absence of interactions, relationships, and connectedness to others further emerged as a result of the strategies employed by public health professionals to mitigate the spread of the COVID-19 virus (Malcolm, 2020). Considering the socialization needs of humans, measures like stay-at-home orders and physical distancing were necessary to decrease viral transmission rates. Yet these practices, designed to isolate people from each other, were not without consequences. Psychological issues like depression and anxiety were intensified, which led to loneliness and a decrease in access to support systems (Edwards et al., 2020; Fuller et al., 2020).

In addition to diminishing wellbeing, social isolation also impacts the academic performance of learners. As a result of social isolation, one in five healthcare students experienced academic difficulty related to the negative effects of diminished executive functioning and increased dysphoria (Ray et al., 2019). If social support is proposed to improve wellbeing and lessen the prevalence of depression, effectively improving students' academic performances, it is important for educators to explore the prevention of social isolation in the academic setting. Fuller et al. (2020) assert that the effects of loneliness magnified by the pandemic will likely not conclude in the post-pandemic era. Therefore, it is important for educators to proactively understand social isolation, loneliness, and wellbeing and be innovative in implementing ways to support students experiencing these complex issues, especially in the face of continued virtual learning.

Barriers to Motivation, Wellbeing, and Resiliency

As with social isolation, the significance and importance of motivation, wellbeing, and resiliency was exemplified by new challenges associated with the pandemic. The effects of trauma from the pandemic affected those who are non-frontline health workers, such as students, due to the lack of understanding, exposure, or mixed signals and information presented by the media (Schlesselman et al., 2020). The anxiety induced from fear of the unknown likely affected wellbeing and played a major role in determining the student response to coping and stressors. Traumatic and stressful events, like the COVID-19 pandemic, can intensify the strains on students who are still undergoing identity development, as students with unmet psychological or physical needs might struggle to focus on their academics, making it almost impossible to excel (Schlesselman et al., 2020). Therefore, neglecting student wellbeing negatively affects the ability to be resilient, as it is correlated with poor mental health and impaired response to trauma and stress (Stoffel & Cain, 2018).

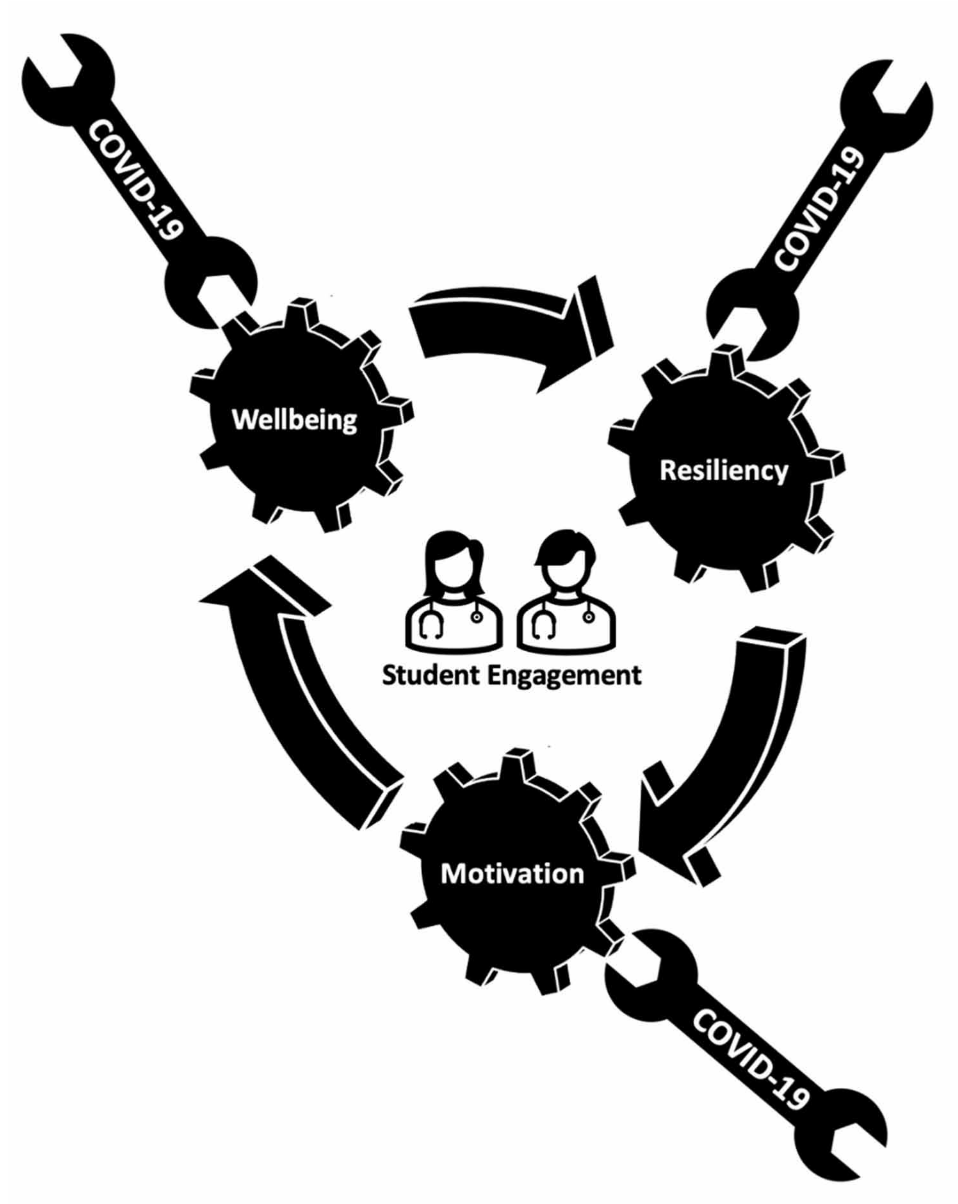
As discussed previously, motivation plays a pivotal role in student success and well-being (Orsini et al., 2016). This area was further highlighted by the pandemic due to the influence of anxiety and fear of the unknown. Bandura's social-cognitive theory helps to shape the linkage between motivation and environmental experiences. The theory states that learning, performance, and motivation are shaped by life events and influenced by the environmental factors that students experience (Cook & Artino, 2016). This proposes two significant questions. First, how was student motivation impacted by switching to virtual instruction? Second, how did quarantine restrictions affect motivation and overall wellbeing?

According to Shawaqfeh et al. (2020), the main challenges for health profession students, created by virtual learning during the COVID-19 pandemic, consisted of impaired mental health, difficulty transitioning to online materials, and a lack of personal connections. Generally, it is assumed that in-person instruction is more valuable as compared to virtual instruction, as it helps to nurture academic and social experiences, relationships, and collaborations. As a result of a lack of these types of interactions during the pandemic, learning capabilities, academic successes, and motivational levels among students were undermined (Shawaqfeh et al., 2020). When combined, these threats to academic, social, and personal successes will be amplified and even uncover mental and physical disparities. This is supported by findings from Shawaqfeh et al. (2020) which claim that pharmacy students feel disconnected or bored during online classes that were born out of emergency situations (like a pandemic), which further lessens their motivation to engage and learn virtually. Overall, the switch to virtual instruction and the dramatic decrease in social interactions seemed to have a snowball effect on already fragile levels of student self-motivation, in addition to negatively impacting enthusiasm, engagement, confidence, and resiliency.

In addition to challenges with virtual learning, social restrictions played a role in the psychosocial and psychological wellbeing of health professions students. This was represented by students feeling academically burnt out, a natural consequence of persistent stress, diminished satisfaction, and social isolation. Not surprisingly, students say it can be difficult to motivate themselves to learn effectively when they lack personal connections (Lyons et al., 2020). The majority of health professions students are a part of highly collaborative curricula that relies on teamwork, relationships, and interprofessional collaboration. These students are typically accustomed to social support, study groups, and hands-on learning experiences, all of which boost morale and spark motivation. With the occurrence of the pandemic, all learning experiences (courses, labs, meetings, etc.) were swiftly shifted into the virtual realm for which they were not acclimated. This restricted built-in support groups and quality exchanges. As a result, students might be less engaged in their academic progression and achievements. In addition, without the ability to effectively construct and maintain meaningful relationships with peers and faculty, the aspects of motivation that rely on positive human interactions will be underdeveloped (Whitfield et al., 2021).

To best illustrate the challenges associated with the COVID-19 global pandemic in association with student engagement, including health professions students' academic achievement and personal well-being, we propose Figure 2. The challenges of motivation, wellbeing, and resiliency in light of social isolation are represented as three separate gears, which embody continuous movement of the essential components of health professions students' engagement in the learning process. Additionally, the COVID-19 pandemic, and the various effects associated with it, are represented by wrenches, which subsequently impact, or 'grind', the three gears. While the three gears are distinct entities, they are also inextricably interrelated. While the COVID-19 pandemic will continue to alter traditional instructional methods and human interaction (Medina et al., 2020), the multifaceted issues presented become even more significant.

Figure 2. Depiction of challenges to student engagement related to teaching and learning during a pandemic (© 2021, Auburn University Harrison School of Pharmacy)



Effects of a Pandemic: Reframing the Question

Educators have known that students have struggled with issues related to engagement and motivation for as long as classrooms have existed. Studies and resources on the topic are plentiful. Navigating a pandemic, transitioning all learning experiences into the virtual space, and effectively removing all in-person interactions, seemed to highlight these existing issues in new light (Schlesselman et al., 2020). As a result, the problems have since evolved away from the way we have traditionally understood them.

This spurs a philosophical question: do we keep trying to improve classroom engagement through traditional mechanisms or mindsets, or do we try novel or unexpected approaches? We suggest that the answer is the latter.

Although it may be too early to fully answer this question, the pandemic *has* offered the opportunity to at least redefine these problems. Understanding and defining problems is the first step in finding solutions. Early and anecdotal explorations at AUHSOP suggest that the pandemic has accelerated our efforts in these areas, thus allowing us to refocus on the issues in a new way. Faculty at AUHSOP, and perhaps faculty at every institution, have historically been aware of issues involving student engagement, including motivation, wellbeing, and resiliency. However, efforts to address these have previously been met with more questions, hesitancy and justified concern. One such question may include: who is responsible for engaging students in their learning? Is it the student's personal responsibility, faculty member's responsibility, or both? As a result of embracing widespread virtual instruction during the pandemic, this question evolved into how we can engage faculty in the student experience, including teaching, in an effort to engage students in the learning process?

To provide some context to this new question, we must take a step back. The pharmacy program as AUHSOP has delivered the curriculum remotely to a satellite campus for many years. Despite this long-standing dual-campus design, historical efforts to enhance learning in this virtual environment, either synchronously or asynchronously, have been slow to evolve. This relates back to the question regarding where the responsibility for engaging students lies, as some faculty have felt this responsibility lies on the students whereas some students have felt this responsibility lies on the instructor. Coupling this dichotomy with the forced disruption of the pandemic and *everyone* embracing virtual delivery models (many for the first time) – the problem of engagement was reframed and compounded. Choices related to pedagogy and content delivery were removed, meaning faculty at most schools no longer had a choice on modality. Choices for the learning environment were also removed, meaning students no longer had the option to collaborate, connect, or learn in in-person settings. As a result, faculty and students alike had to exit their comfort zones to become accustomed to virtual learning. The notion of embracing virtual delivery as a viable method of course delivery moved to the forefront of academic issues. Naturally, embracing change and feeling a sense of belonging in a new environment requires, among many things, motivation, resiliency and a sense of wellbeing (Lyons et al, 2020). As discussed in previous sections, the ability to cope and thrive during the pandemic period was especially challenging if these psychological constructs were lacking beforehand. As a result, motivation, wellbeing, and resiliency, and ultimately engagement were reprioritized and reframed in the academic setting at AUHSOP and beyond, and the latest question related to engaging both faculty and students emerged and thus is the focus of the next section of this chapter on the post-pandemic era.

SOLUTIONS AND RECOMMENDATIONS

Fostering Future Opportunities 'Post-Pandemic'

Without a doubt, the COVID-19 pandemic will have left a mark on the academic world. Due to the rapid evolution of the situation, the full extent of the impact will take time to be revealed and understood. As we continue to learn from the pre-, mid-, and post-pandemic challenges, we encourage educators to reimagine the issues presented as opportunities instead. As Romanelli et al (2020) asserted, "the deeper the crises the greater the opportunity" (p. 666). For all intents and purposes, health professions education is at an impasse. Will there be an opportunity to 'go back' to how things were before the pandemic? And even if these opportunities exist, is it is in our best interest to return to 'normal' or to capitalize on what we have learned? We contend that the global changes we endured as a result of the pandemic equipped students and educators to make adaptations and leaps of faith that ultimately resulted in needed improvements related to flexibility in the learning environments. Therefore, how can we, as educators, leverage these opportunities to positively engage and motivate students and faculty, while also fostering resiliency and wellbeing?

As the pandemic necessitated, the process of shifting pre-existing classroom lectures and active learning activities into the virtual space at AUHSOP was relatively straightforward. This is not to say it was without its challenges and discomforts, just that it occurred effectively with reasonable effort. However, on the other hand, our skills lab experiences, proctored assessments, and Performance Based Assessments (PBAs) had to be completely reimagined into effective virtual formats. Some of the lab and PBA experiences were found to be too challenging or incapable of transitioning and were thus scrapped to be reconsidered at a later time. Interestingly, what happened as the pandemic continued is that many of these experiences stayed in a virtual format despite the potential opportunity to revert them back to on-campus experiences. This was because some faculty realized that the virtual environment offered flexibility and encouraged safety. As a result, the AUHSOP PRC curriculum has thus far evolved into a hybrid delivery model with the plans to keep components of this modality at the conclusion of the pandemic.

Opportunities to Thrive: Mindset, Social Support, and Resilience

Seeing as though the effects from the COVID-19 pandemic will continue to emerge, the question remains on how educators and students can move forward with new opportunities to promote success, growth, and engagement. Methods have emerged to promote resiliency and enhance social support among students in an effort to overcome the adverse effects of social isolation as well as the trauma from the pandemic (Mosanya, 2020; Schlesselman et al., 2020). Focusing on important areas of engagement, like motivation, wellbeing, and resiliency is critical to improving engagement in the classroom. Further, engaging students in educationally purposeful activities improves academic performance and persistency (Kuh et al., 2006; National Survey of Student Engagement, 2019). Seeing as though engaging students in the classroom does not just 'happen', so then becomes our collective mission as teachers to facilitate student engagement through intentional mechanisms. Resilience, as previously defined, has been associated with a greater ability to cope with distress. As a result, this characteristic is exceedingly important when grappling with the short-term and long-term effects of a pandemic (Mosanya, 2020). Two psychological constructs known to promote resiliency and wellbeing among students are grit and growth mindsets (Mosanya, 2020). A growth mindset refers to the idea that students can achieve things through their own personal efforts (Mosanya, 2020). Evidence suggests that a growth mindset positively impacts learning, motivation, resilience, effort in the classroom, and overall academic performance and engagement (NSSE, 2019), while minimizing worry. This is opposite of a fixed mindset, which is associated with idleness.

In addition to the growth mindset, a grit mindset has also been proposed as a way to promote student resilience, and ultimately academic success and ability to adapt to challenges (Mosanya, 2020). A grit mindset refers to the innate ability to remain steadfast in persevering towards goals and to attain accomplishments. Like the growth mindset, the grit mindset has been positively associated with undergraduate student performance including academic achievement and decreased levels of stress and anxiety

(Mosanya, 2020). Since grit and growth mindsets have been shown to improve student resiliency and promote academic success, strategies to promote and implement these mindsets into higher education curricula have become all the more critical to embrace.

One method proposed to encourage a grit mindset, and ultimately enhance engagement through building resiliency among students is shifting perceptions of personal goals. Two approaches to goals include a mastery goal orientation and a performance goal orientation (Park et al., 2018). While a performance goal orientation focuses on competing with others and demonstrating abilities to outshine other students, a mastery goal orientation focuses more on personal development and improvement for the betterment of the individual. At AUHSOP, a mastery goal orientation is equivalent to mastering the curricular competencies and achieving benchmarks, whereas performance goal orientation is synonymous to earning a desired grade. When it comes to learning, a mastery goal orientation is much more preferred because it focuses on what was learned versus what was achieved. Not surprisingly, a mastery goal orientation has been associated with a greater level of adaptation to stressors (i.e., grit and resilience), and students possessing this approach to achieving goals have also demonstrated a higher level of effort (Park et al., 2018). Classroom goal structure is important to promote student development of this mindset. While a performance-structured environment may focus on and praise students for outperforming others and place students in groups based on test averages, a mastery-structured environment focuses more on promoting students to develop skills and grouping students together based on personal interests. Evidence has shown that students who perceive their environment to be mastery-structured have greater persistence and put forth more effort (Park et al., 2018). By simply shifting the way goals are approached at an institutional level, perhaps educators will be more likely to instill grit and resilience in students. This will help learners to navigate issues in the short term, like a global pandemic for example, but also better prepare them for future practice as they handle the stressors of patient care.

Another strategy that educators should consider is encouraging and supporting students socially. Social support is feeling supported by others through a reliable social network (Cobo-Rendón et al., 2020). As noted previously, mental health and wellbeing are heavily reliant on social support and social interactions, and the absence of social support has been associated with isolation, loneliness, and increased stress, all of which are known to impact academic success (Mosanya, 2020). Although different methods of assessing social support through rating scales and questionnaires exist, many studies focus on themes including support provided by family, friends, and significant others (Cobo-Rendón et al., 2020). There are unique initiatives schools may take to ensure that students feel socially supported. For example, placing students in groups with peers to foster friendships (even if the groupings are virtual), providing students with a mentor to build a relationship with beyond the classroom, and ensuring students have reliable access to a counselor. Moving forward in the post-pandemic era, a renewed focus on classroom socialization will be important, regardless of delivery modality.

When considering how to enhance student engagement, it is imperative that educators foster learning environments that promote resiliency in their students. Resiliency is key in ensuring students adapt and succeed in their academic programs (Kulig & Persky, 2017). Within pharmacy education, the American Association of Colleges of Pharmacy (AACP) calls on all pharmacy schools to strive to promote a culture of wellness and resiliency (AACP Statement on Commitment to Clinician Well-being and Resilience). AACP encourages pharmacy programs to advocate for overall wellness and stress management techniques for all students, faculty, and staff. Cain (2020) suggests that overall student wellness is a complex and nuanced issue that requires a multifaceted approach at a variety of institutional and individual levels.

Activities such as yoga, meditation, and mindfulness can improve aspects of wellbeing for students and faculty. After participating a 6-weeks of yoga and meditation sessions, students self-reported a decrease in anxiety, stress, and increase in mindfulness (Lemay et al., 2019). Although these activities have shown effectiveness in decreasing stress and anxiety, there is limited research to indicate that students are able to establish and maintain these interventions (Cain, 2020). Further, some healthcare policy groups have employed the "nudging" principle to encourage the integration of healthy lifestyle habits into everyday life. Nudging strategies encourage ideal behaviors without coercion or repercussions for failure to comply. This psychological method nudges students to make good lifestyle decisions with positive reinforcement and support (Quigley, 2013). It is evident that educators have a responsibility to promote student well-being to cultivate resiliency. Table 1 provides barriers and associated ideas for promoting positive strategies among students. These activities and themes can be applied to address the effects of the pandemic but also incorporated into future programs as mental health has been a longstanding determinant of wellbeing for students.

Table 1. Methods of promoting mental health, motivation, wellbeing, and resilience

Barriers	Strategies
Related to Mental Health ● Depression ● Anxiety	● Promote growth and grit mindsets ● Schedule time for relaxation and/or hobbies that are enjoyable (watching movies, playing video games, etc.) ● Develop personalized coping strategies to help manage and/or prevent anxiety from stressful events ● Participate in stress management techniques, such a yoga, meditation, or mindfulness
Related to Physical Health ● Sleep disturbances ● Unhealthy diet ● Lack of exercise	● Allocate an appropriate amount of sleep each night ● Set small, achievable goals for meal plans and exercise that can be incorporated into a daily routine ● Consider collective monthly challenges intended to target an area of physical health
Related to Virtual Learning ● Digital literacy ● Technical problems ● Information overload ● Wandering mind ● Long-term focus ● Self-directed learning	● Seize the opportunity to increase technology competence ● Develop online networks, support groups, or study sessions to promote personal connections ● Create a "study space" for virtual learning that is comfortable and free of distractions ● Take short periodic breaks from virtual learning to promote long-term focus ● Create a routine that requires personal accountability, attendance, and attention ● Maintain transparency with students when making decisions on instruction methods and allow for student involvement
Related to Social Isolation ● Quarantine ● Burnout	● Encourage socialization within the learning environment ● Avoid burnout by keeping a journal to help maintain lifestyle balance and track what does and does not work ● Maintain personal and/or virtual communication with peers, mentors, and professors
Related to Trauma Support ● Emotional, intellectual, and interpersonal needs	● Train faculty and staff on best methods for supporting students' post-trauma ● Encourage faculty to be responsive and receptive to students when sharing personal experiences ● Facilitate student-student and faculty-student check-ins ● Recognize historical traumas in relation to race, gender, and sexual orientation

(Adopted from Cain, 2020; Lemay et al., 2019; O'Driscoll et al., 2019; Schlesselman et al., 2020; Zollars et al., 2019)

Learning to accept challenges that are outside of one's control is important for health professions students to have when experiencing rigorous curricula, both during a pandemic and into the future (Whitfield et al., 2021). Students should be encouraged by their efforts and reflect on all that they have accomplished during their academic hardships. This mindset reworks the negative aspects associated with COVID-19 and transforms them into opportunities to be seized. According to Bandura, unless people believe their efforts will produce the desired effects, there is little incentive to act (Cook & Artino, 2016). Therefore, motivation is best fostered through an optimistic outlook, which will intrinsically promote motivation, increase confidence, and uphold resiliency.

By utilizing the key strategies introduced in Table 1, health professions students may be more equipped to manage some of the most common challenges to their motivation and overall wellbeing beyond the COVID-19 pandemic. In addition, because students experience different barriers to success, each student amasses a unique set of resilience factors (Schlesselman et al., 2020). Oppositely, we must also consider that not all issues related to engagement, academic success, and wellbeing are hampered by virtual learning, COVID-19 quarantine, or any related obstacle. Regardless, all students should be aware of the adversities they may face throughout their time in graduate or professional school. These students should be self-supporting and goal-oriented when challenging motivational barriers, such as poor mental and physical health, virtual learning, or social isolation. In addition, students should be supported through their peers and health professions educators so that they maintain a sense of relatedness, approval, and camaraderie. Encouraging the development, maintenance, and nourishment of student self-motivation through these strategies will provide positive academic and health-related outcomes for these students.

Lessons Learned

The COVID-19 pandemic not only changed the educational landscape during the initial shift to virtual delivery, but will continue to shape the classroom of the future. We must learn from experience with how it brought forward new challenges, while also highlighting barriers to engagement and wellbeing that students were struggling with pre-pandemic. Moving forward, educators should embrace these lessons learned and focus efforts to improve these regardless of environment or delivery modality. As such, we can assume that the virtual classroom, in whole or in part, is here to stay in some form. At AUHSOP for example, the pandemic has meaningfully challenged the way in which the school operates. The program decided to continue the momentum and adopt a hybrid approach to content delivery moving forward as a mechanism to encourage flexibility and wellbeing. The program also aspires to remove one class period per week to incorporate other important aspects of the student experience, like mentoring, remediation, and experiential programming. The removal of one class period per week equates to the removal of three-hours of class time, which is the equivalent of one entire class day. To thrive in the post-pandemic classroom means not only addressing identified challenges, but also using them as opportunities for growth as we engage faculty in the student experience and head into an unknown future.

Through the experiences of the COVID-19 pandemic and further exploration of its effects on health professions students' engagement in the virtual or hybrid classroom, educators at AUHSOP have realized that the degree of resiliency that faculty and students needed to embrace was exceptionally high, and many were not prepared for this reality. One reason for this was likely the structured and planned nature of the pharmacy curriculum, making it challenging to accept procedures and expectations that fall outside the typical lines. Another reason could have been the expectations that faculty and students place on themselves and others to be highly functional and successful, thus equating the notion of 'less than' as a failure. Stated differently, functioning at a lesser capacity than before, due to the nature of surviving a pandemic, might be considered a failure rather than an opportunity to reframe the definition of success. This could be very common in health professions education, as a 'failure' may be perceived as unacceptable and result in patient harm. A third reason for the lack of resiliency could have been removal from the physical learning environment, thus eliminating the context and culture for which students and faculty are accustomed and also resulting in students being isolated. As a result of these factors, and others, the authors learned that being resilient and therefore engaged, especially sustaining these attributes, has to be an intentional choice that is modeled by the faculty and the organization. It relates back to a growth mindset and being willing to accept change because it can facilitate personal and professional growth. It is not always easy to embrace this attribute amid constant and unpredictable change, but being steadfast in this regard is a key ingredient to maintaining a sense of motivation and wellbeing. Faculty and students therefore must identify and maintain an optimistic outlook as we transition into the classroom of the future.

Moving forward, encouraging students to focus on the goals needed for mastery can also improve resilience and encourage the grit and growth mindset we now understand to be so important (Mosanya, 2020). This will likely require the intentional focus of faculty to be explicit in identifying and communicating these goals. Doing so can help improve resiliency as students become more aware of the mastery or understanding of the stated goals. In the Practice-Ready Curriculum, which is team taught, we propose our faculty redesign class periods and units to focus students on mastering the skills and knowledge associated with the unit. Faculty would need to communicate clear and achievable mastery goals at the beginning of each class period and/or unit while structuring the class period or unit and delivery modality to allow students the opportunity to achieve mastery. It is important that faculty fully consider the mastery goals in the planning phases and utilize the principles of backward design to identify the evidence needed to demonstrate mastery, as well as the formative assignments and summative assessments needed to create this evidence. Although the PRC has historically incorporated active learning, providing faculty the opportunity to focus on building activities directly aligned with the mastery goals, revisiting this core design element is likely needed. This reminder is required because faculty need to be explicit in showing students how they have achieved the learning goals.

While social isolation was perhaps easy to understand in the setting of mandatory quarantines, it also played a role in student engagement by affecting wellbeing. This fact, combined with the increasing use of the virtual space, educators need to find new ways to address social isolation head on. During the midst of the COVID-19 pandemic, educators at AUHSOP attempted to address isolation while in the virtual classroom. Zoom was the platform utilized by the university, and the breakout room feature became a common way to foster teamwork and social support. Students in our program commented on the ability to work in teams actually increasing in this environment. Utilizing the breakout room feature as a mainstay of the virtual classroom may help students obtain the social support they need from peers while also continuing to build teamwork skills. Perhaps even allowing time for 'non-class' activities while in the breakout rooms during class will help students build those relationships previously forged in the hallways or at the water cooler. Addressing social isolation in small or big ways, as a component of pedagogical approaches, would likely have greater impact on learning than the addition of class time for content delivery.

In addition to breakout groups on Zoom, the use of pre- or post-class time to help students get to know each other and build connections in the virtual space could also address engagement issues. Curricular Coordinators at AUHSOP attempted to achieve this by encouraging students to join class five minutes early and present a 'virtual field trip' or fun fact about themselves. Educators learned that students, particularly first-year students, were hesitant at first to speak to one-another in a virtual format but typically enjoyed engaging in these type of low stakes team-building activities. This was largely because they broke the monotony of content delivery and cultivated camaraderie. Educators also learned that these activities must be heavily facilitated by a faculty member, as students typically had to be encouraged to step out of their comfort zones in this regard.

While some assessments work better in the classroom environment, AUHSOP identified ways to improve skill-based assessments with the implementation of a hybrid model. Certain labs evolved and became more positive experiences for students in a virtual setting. New ways to engage students on a one-on-one basis through enhanced mentoring and increased faculty office hours were also identified. While it was not perfect, and admittedly never will be, it allowed the acceptance of new realities related to virtual education. Because the Curricular Coordinators were passively present in every class session, they were able to readily identify students who demonstrated 'red flags', while also noticing trends in student behavior and performance. As a result, they were able to intervene or investigate student issues. While the set-up and dynamic of programs are different, AUHSOP learned the value of having student support personnel, like the Curricular Coordinator, readily available to support students. As reported by Kuh, et al. (2006), investing in student support services is critical to student engagement. AUHSOP also has mentors readily available to students as part of our Village Mentoring System. Each student is part of a village that meets every semester with peers and/or mentors, oftentimes as a mechanism to promote fun and friendship. These interactions are another mechanism for students to feel support from peers, staff, and faculty. The pandemic showed us that we need to carve out time in our academic calendar to offer even more authentic and purposeful mentoring opportunities.

Lastly, students and faculty alike will need to focus on overall wellbeing. In the classroom, faculty as well as peers can nudge classmates to focus on the integration of lifestyle habits into everyday life. In doing so, they will provide reinforcement and support and can encourage the adoption of healthy activities such as yoga and meditation. This is a lesson learned because it became apparent that the onus is on the educator *and* the student to be intentional in promoting, encouraging, and even assessing the adoption of healthy habits. As Kuh et al. (2006) notes, student participation is not the only requisite to engagement, as teaching and teachers are also at the core. Integration of social components in our collective classroom environments going forward, whether physical, virtual, synchronous, or asynchronous, may be accomplished in small and big ways. It is all about stepping out of comfort zones and embracing an intentional approach to cultivating development of the entire student beyond just content knowledge.

FUTURE RESEARCH DIRECTIONS

The goal of this chapter was to spark a conversation and discuss potential strategies for overcoming longstanding issues related to engagement that have been reframed as a result of the pandemic. There are many areas that warrant further investigation related to this topic. One of the biggest questions we propose relates to how we can collectively build off the momentum from the pandemic to further enhance flexibility and learning in the classroom. Before the pandemic, virtual learning was an abstract and undesirable modality for many, but over time, it may become the preferred format for classroom delivery in many instances. How can we leverage what we have learned in the virtual environment for enhanced pedagogical improvements that promote student engagement? Further, how can we encourage faculty to become more engaged, and ultimately take more ownership in students' learning experiences? How can students become stronger partners in this endeavor?

CONCLUSION

Just as we have done in the layout of this chapter, a relationship emerges as we consider what was known about student engagement, and therefore motivation, wellbeing, and resiliency *prior* to the pandemic, what is to be learned from experiences made even more difficult by social isolation *during* the pandemic, and how virtual learning and the post-pandemic classroom can evolve *in response to* the pandemic. Through it all, it was apparent that faculty and students not only survived the shift associated with the pandemic, but even perhaps thrived in the face of this adversity. The lesson we collectively learned relates to the following exclamation: See, we did it!

The COVID-19 pandemic forced the quick transition to a virtual classroom and brought to the forefront challenges to student engagement including motivation, wellbeing, and resiliency. While these challenges were highlighted during the pandemic, our experience also allowed us to evaluate the pre-pandemic period to see how these were previously evident in the classroom. As the pandemic fades and a 'new normal' comes into focus, educators must take this opportunity to learn from our collective understandings and improve the entire classroom experience for our students going forward. Doing so will allow students and faculty to not only engage and excel in the physical classroom but also thrive in the virtual learning environment which will likely play a significant role in our futures.

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KEY TERMS AND DEFINITIONS

Faculty Engagement: Instructors recognizing their role beyond content delivery, and taking an intentional, active role in facilitating learning and encouraging development among learners.

Grit: Persevering towards a goal or objective and overcoming any obstacles that stand in the way of achieving it.

Health Professions Education: Professional students enrolled in a health professions program, including nursing, medicine, pharmacy, physical therapy, occupational therapy, physician's assistant, etc. This includes students in a post-graduate program or undergraduate program who will be licensed healthcare providers at a future date.

Motivation: Feeling a sense of internal purpose, resulting in taking ownership within the learning environment.

Resiliency: Being able to emotionally adjust to changes and reprioritize without letting changes affect wellbeing to a large degree.

Social Isolation: Being physically or emotionally secluded from others to a degree that it negatively affects wellbeing.

Student Engagement: Learners recognizing their role beyond passive participant and being invested in the learning process with innate curiosity and drive.

Wellbeing: A holistic approach to being and feeling well across multiple domains, including cognitive, psychological, social, physical, and emotional areas. Wellbeing is an internal feeling that fluctuates over times; it is challenging to observably measure.

Chapter 4
Creative Solutions for Today's Students:
A Case-Based Approach to Optimize Face-to-Face, Hybrid, and Remote Learning

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ABSTRACT

This chapter will explore the connection between diversifying health profession student demographics, diversifying challenges these students face, and the new obstacles presented by shifting curriculum delivery to remote and hybrid learning during the coronavirus disease 2019 (COVID-19) pandemic. The chapter will explore challenges that may seem especially difficult to address in a remote learning model: the desire to develop community among fellow learners when in a hybrid or fully remote program and when learners are from varied backgrounds; cultivating in students coping mechanisms to manage anxiety from the economic uncertainty of today's world, balancing commitments between educational pursuits and other responsibilities (e.g., child or parent care, etc.); and facilitating learning for students with physical and/or mental disabilities or chronic medical conditions.

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INTRODUCTION

There are many challenges that students face today. Some of them are out of our control to manage as instructors; however, others can be strategically mitigated or lessened to help students better engage in learning. Some challenges that today's students face are feelings of a lack of belonging due to differences in ethnic and social backgrounds among their peers (Johnson, 2020); barriers stemming from differences in physical and mental health statuses and learning styles (Meeks & Neal-Boylan, 2020); balancing commitments between educational pursuits and other responsibilities (e.g. child or elder care) (Institute for Women's Policy Research, 2021; Horovitz, 2020); and inadequate coping mechanisms to manage anxiety from political and economic uncertainties of today's world (Kunzler et al., 2020; Malau-Abuli, 2011; Savitsky et al., 2020; Schiller et al., 2018). Helping students manage these challenges may seem even more difficult when the curriculum is being delivered in a remote or hybrid format. Addressing these challenges requires creativity and incorporating flexibility in course delivery and advising (Weinberg, 2021).

This chapter will provide the reader with ideas for creative course delivery and advising and is divided in three sections: (1) incorporating flexibility into didactic and experiential course structure; (2) optimizing learning for students of varying levels of physical and mental abilities, family circumstances, and health statuses; and (3) supporting students' non-cognitive and psychosocial needs.

The Coronavirus Disease 2019 (COVID-19) pandemic shed new light on the challenges today's students face. The pandemic forced many colleges and universities to deliver curricula fully remotely or in a hybrid (both on-campus and remote) model. This remote delivery of curricula removed social interaction and a sense of social community that students desired in their college experience. Due to closures of schools and daycare centers and concerns for loved ones' COVID-19 exposure in long-term care facilities, many students had to assume new caregiving responsibilities alongside their responsibilities as students. Moreover, the uncertainty and loss of normalcy caused by the pandemic created new anxieties in some students and heightened pre-pandemic anxieties in other students. Finally, the move to remote and hybrid models of curriculum delivery may have removed an additional layer of support and created unintended learning challenges for students with disabilities (Gibilisco, 2020).

A variety of educational resources and literature address these aforementioned issues. This chapter provides cases that depict each of these challenges and provide practical tips to address them. In addition, it will provide insights about the potentially lasting effects the pandemic may have on instructional models in health professions education in the post-pandemic world. The over-arching goal is to make the case that rigor may be maintained while also providing flexibility in instructional delivery, nurturing students' non-cognitive skills, and supporting their psychosocial needs.

BACKGROUND

Beware of Challenges in Current Educational Climate

The challenge of adapting teaching approaches to each new generation of learners is not new; however, the advent of remote and virtual learning has added another challenge to achieving this task in higher education to tackle the task. Today's learners face unique challenges, including varying levels of physical and mental abilities (Meeks & Neal-Boylan, 2020), changing family dynamics and responsibilities

(Institute for Women's Policy Research, 2021; Horovitz, 2020), barriers to inclusivity and diversity (Acholonu et al., 2020), psychosocial factors (Beiter et al., 2015; Liu et al., 2019), and facing anxiety related to the economic and political uncertainty of today's world (Savitsky et al., 2020).

Currently, training on how to address these issues only considers the traditional format of in-person environments, and information is lacking on best practices to approach students who are facing these problems in a remote space. In a post-pandemic world, where higher education is likely to shift to more virtual formats than ever before, faculty should feel equipped with resources and guidance on how to best meet their students' needs. Instructors must evolve and learn practical strategies on teaching, guiding, leading, and meeting the needs of students in face-to-face and virtual environments, especially for those students who require a higher level of faculty and staff support to succeed academically and develop a sense of professional identity.

TEACHING WITH FLEXIBILITY AND CREATIVITY IN CHALLENGING TIMES

The authors will utilize cases to offer ideas of ways that instructors can incorporate flexibility into their didactic courses. In addition, this chapter will provide cases depicting specific challenges that students with physical and mental health disabilities may face and how instructors may assist the student to navigate these challenges. Finally, the chapter will provide cases describing psychosocial barriers today's students face and ways instructors can support students as they navigate these barriers. The authors will describe the importance of mentoring and coaching to bolster students' non-cognitive skills (i.e., skills associated with professional success that are not directly related to intelligence and intellectual aptitude; some refer to them as soft skills (Khine, 2016)) and provide examples of ways to incorporate mentoring and coaching in fully remote and hybrid delivery models.

Issues, Controversies, Problems

Higher education was undergoing changes before the pandemic (Mintz, 2019), and the pandemic quickened the pace of some of these changes (Huseby, 2021). These pre-pandemic changes were the result of many factors, including new expectations from a new generation of learners and diversified needs of a more diverse student population. In this section the authors summarize new expectations of Generation Z, a new generation of learners; challenges faced by students with caregiving responsibilities and students with disabilities; and psychosocial supports needed to build resilience and a sense of belonging in students.

Unfortunately, the pandemic's disruption of students' interpersonal connections with classmates, faculty, and staff distressed students beyond the usual college stressors (Lederer et al., 2020). Furthermore, the need for remote learning, a consequence of social distancing protocols, revealed inequities in access to essential resources for remote learning, such as reliable broadband and electronic devices with sufficient word processing capabilities and processing speeds. This new appreciation for unequal access to basic resources for learning inevitably will lead to calls for health professions instructors to devise their courses, especially hybrid and fully remote courses, in ways to mitigate the disproportionate, negative impacts resulting from inequitable course policies and teaching approaches (Soika, n.d.; Zinshteyn, 2016). In addition, instructors may be faced with a growing expectation to serve in expanded roles related to providing student support, including developing students' coping skills, resilience, and sense of belonging and wellness (Amsurd et al., 2019; Salana et al., 2020). Finally, amid changing expectations related to course administration and faculty serving additional roles in student support efforts, faculty must also keep abreast with technology to ensure they can connect with a new generation of learners who engage with information differently from past generations (Mosca et al., 2019).

The authors describe in the following subsections some of the factors spurring changes in higher education before the pandemic: Generation Z students' learning preferences; challenges faced by students with caregiving responsibilities and students with disabilities; and growing psychosocial supports that today's students need and seek during their college experience.

Generation Z, a New Generation of Learners: Their Expectations Before the Pandemic

Members of Generation Z, the name given to the generation of children born between 1995 and 2010 (Seemiller & Grace, 2016), have begun entering health professions programs. These learners are unique in several ways. This generation grew up with social media and smartphones as a mainstay in everyday life. With the existence of online search engines available to them during pre-college education years, research and learning have become faster and more efficient (Seemiller & Grace, 2016). Generation Z has witnessed the effects of economic downturns and unstable employment rates. For these reasons, members of this generation value education that is useful and relevant to getting a job after graduation. Accordingly, they also value practical, hands-on, real-life learning offered by experiential learning. Assignments and coursework that hone critical skills that employers would value may be appealing to these students (Seemiller & Grace, 2016; Mosca,et al., 2019). Mosca and colleagues' research further affirms Seemiller & Grace's findings. Mosca, et al. (2019) surveyed college students to determine their learning activity preferences. Of the 133 general business, communications, healthcare, criminal justice, accounting, finance, and marketing program majors who completed the survey, 98% agreed with the statement that "videos help to bring in real-world situations'', and 96% agreed with the statement that "I feel I learn more by 'doing' than be [sic] lectured to".

Moreover, members of Generation Z desire flexibility in their programs. As Seemiller and Grace (2016, page 185) phrase it, "they prefer to learn on their own time and in their own way". Mosca and colleagues advocate for flexibility as a way to empower students and increase the likelihood that students will engage in their learning. They assert that "Empowering students may increase their engagement, [and] empowerment is accomplished by allowing the student to put forth their own ideas…[and] set their own schedules." Therefore, educators should consider incorporating greater flexibility into assignment and/or assessment selection, when possible. However, the authors of this chapter recognize that flexibility may not be possible for all aspects of a health professional curriculum because there may be certain skills which all health professional students within a specific discipline must demonstrate competency to become a licensed practitioner.

Most universities implemented forms of completely remote course delivery or hybrid course delivery models during the COVID-19 pandemic. In hybrid models, some course content or course assessments are delivered in real-time in a face-to-face setting or a virtual setting, and other activities are completed outside of class on the student's own time and at the student's own pace. Learners in this generation may have found that they prefer a hybrid approach to course delivery because of the flexibility it provides. As course delivery models return to pre-COVID norms (i.e., mostly face-to-face delivery), administrators and educators should anticipate that students will desire aspects of hybrid and remote learning that give them flexibility to complete learning activities at times more convenient for them. Mosca et al. (2019, page 67) posit that "universities who [sic] are entrenched in the traditional model of teaching…should consider a change." The COVID-19 pandemic makes this sentiment even more relevant.

Students with Caregiving Responsibilities

A growing number of adults have assumed caregiving responsibilities for loved ones, so it is no surprise that a growing number of adult learners are assuming caregiving responsibilities, too. The American Association of Retired Persons (AARP, 2020) estimates that 5 million adults attending post-secondary education programs (i.e., colleges, universities, or trade schools) are primary or secondary caregivers for parents or grandparents.

Caregiving responsibilities add a new dimension of challenges to students' learning. In a survey of 400 AARP members, 35% of survey respondents turned in late assignments, 13% failed a course, and 11% had to withdraw from school. In addition, 72% of respondents felt overwhelmed attending school at the same time as being a caregiver, and 64% did not know where to turn to for help to manage school and caregiving responsibilities. AARP's report describes the additional stress caregivers have felt amid the pandemic.

According to the Institute for Women's Policy Research, an estimated 22% of all undergraduate college students are parents. The estimated percentage of health professions students who are raising school-aged children is difficult to ascertain. However, as the number of undergraduates who are parents grows, we can expect that some of these students will seek training to become health professionals.

The move to remote learning formats may have provided for some students who also serve as caregivers additional flexibility with offering aspects of courses asynchronously. Asynchronous content describes content the learner may view at his/her own time rather than at a lecture time pre-determined by the University. Flexibility is essential to ensure successful completion for caregivers, and building flexibility into courses may increase these students' chances of successful program completion.

Students with Disabilities

As most faculty are aware, the Americans with Disabilities Act (ADA) from 1990 and its Amendment from 2008 provide protection and accommodation for any persons with disability, including students (US Department of Justice). The ADA defines a person with a disability as a person who has a physical or mental impairment that substantially limits one or more major life activities, including learning. The ADA also makes it unlawful to discriminate against a person based on that person's association with a disability. Thus, this law requires that students with disabilities be provided with a reasonable level of accommodations in order to have equal access to learning materials or environment as those without disabilities.

While faculty may be aware of this law and provision of accommodation for students with disabilities, they may exhibit varying levels of perceptions and attitudes toward such students and be hesitant or reluctant to provide accommodations. A literature review by Rao (2004) revealed varied levels of attitudes and perception of students with disabilities among faculty and that faculty who were female, experienced, affiliated with the education department, or with a better knowledge of the ADA demonstrated a positive attitude toward accommodation or more willingness to provide accommodation than those who were not. Thus, faculty's bias or differing attitudes toward students with disabilities may hinder the students disclosing their disabilities to the instructor or asking for appropriate accommodations to enhance their learning.

A growing number of college students report having problems with learning, physical, and/or coping abilities. It is estimated that 12% of students in post-baccalaureate programs had a disability in 2015 (National Center for Education Statistics). In a comprehensive literature review, McClelland et al. (2015) found that ethnic minority students had difficulties with language barriers, which often manifested in suboptimal academic performances and a higher rate of attrition. In addition, discriminatory racial stereotyping and stigmatization were noted as issues among these students. Black and minority medical students in higher education encountered added challenges to learning as they were less likely to progress and succeed in the program. While there may be varying definitions of disability in legal or social contexts, seeing disability as a diverse characteristic and becoming inclusive and welcoming of these differences inherent in all students are crucial for their success in maximizing their learning outcomes (Meeks & Neal-Boylan, 2020).

Health professions students with disabilities have added challenges in learning because of an increased demand and rigor of the curricula including experiential components. Moreover, the COVID-19 pandemic has posed additional challenges for students with disabilities, ranging from intellectual or learning disabilities (Pacheco, 2020) to physical disabilities (Kieser et al., 2021) as most of the instruction was moved to remote or virtual format. One of the most important factors to achieving student success during the emergent time is to provide support and resources to overcome the initial challenges of transition. This may include not only the technological support but also advising for psychological and emotional burden that the students with disabilities may experience.

To help students with physical disability (e.g., auditory, visual, mobility), it is important for the institution and faculty to avail assistive technology such as voice-to-text software, headsets, closed captioning applications, adaptive mouse and keyboards, elevators, automatic doors, etc. especially for experiential education settings (Kieser et al., 2021). Other supportive measures may include optional remote or blended learning, sign language interpreter, and selection of learning environment conducive to the students' maximal learning and engagement. While there is an increasing prevalence of learning disabilities and psychological concerns that inhibit learning, these will not be the focus in this chapter as these conditions are best managed by referring the student to an expert who can effectively identify, intervene, and assist with the necessary strategies than faculty who do not possess expertise in these areas.

Psychosocial Needs of Today's College Students

College students face emotional and psychosocial barriers that hinder them from fully thriving during school and in their transition into the workplace (Liu et al., 2019; Beiter et al., 2015). Students report high levels of stress and feelings of depression and anxiety that were only exacerbated by the COVID-19 pandemic and quarantine (Wang et al., 2020; Kim et al., 2021; Lederer et al., 2020). Trainees in health profession programs in particular face challenges unique to the often relentless and competitive world of medicine, further adding to these negative feelings (Hill et al., 2018; Tung et al., 2018; Fischbein & Bonfine, 2019). When developing one's professional identity, trainees often question if they are competent enough to care for others and take on a huge amount of responsibility; how they will secure a position after graduation while competing against other high-achieving trainees; and if and when they will finally feel like they belong in the medical community. If left without reassurance or support, students can experience depression, anxiety, detachment, shame, and decreased compassion for others. Imposter syndrome, or the feeling of self-doubt and fear that one does not belong despite adequate competency and skill sets (Villwock et al., 2016; Gottlieb et al., 2020; Regan et al., 2020), is a prevalent phenomenon among health care professional students of today. Studies have repeatedly shown that these negative feelings lead to medical errors and poorer patient outcomes (Salana et al., 2020).

The pandemic also led to a nationwide removal of healthcare trainees from clinical sites due to the lack of personal protective equipment (PPE) and to mitigate the spread of infection. This led to further isolation of learners from the world of health care in which they were working so diligently to belong. The lack of real-world, hands-on practice further exacerbated feelings of inadequacy, lack of readiness, and uncertainty in joining the workforce (Villwock et al., 2016; Rolak et al., 2020). Even as we recover from the pandemic, much of the remote learning we have adopted will likely continue in health care professional curricula. Therefore, efforts must be made to negate student feelings of isolation from their profession.

Learners are training through rigorous programs in the context of an ever-changing world, rife with political, social, and economic uncertainty. One of the attractions of a career in the healthcare field is job security and stability; however, major national and world events can leave students feeling as if they lack control of their own futures (Stone & Pate, 2020). The COVID-19 pandemic was marred by economic decline, political upheaval, social unrest, and significant loss of life. Finding one's place in this world, let alone in the healthcare field, can therefore feel extremely challenging and overwhelming. Additionally, these global events have only intensified the spotlight on the inequities faced by members of our own community, including our patients. The medical community is reckoning with implicit biases and systemic racism that continually impact delivery of patient care and is recognizing the dearth of diversity amongst its own colleagues. Health care professions students therefore feel the urgent call and responsibility to address these shortfalls in diversity and equity in their future practice. While examining these problems that our patients face, it is difficult to then ignore that students themselves face similar issues when it comes to lack of diversity, equity, and inclusion in their own training (Hill, 2020; Molock, 2021). When curricula were forced to quickly adapt to virtual learning, those who had the most difficult transition were learners who lacked access to required resources, had less reliable internet connectivity, did not have adequate study or learning spaces, or had additional stressors placed on them due to family, financial, and other obligations. Students from communities of color are more likely to suffer these barriers (Molock, 2021; Mann et al., 2020).

Students often deal with these psychosocial barriers alone and lack the training and support needed to appropriately manage them. As a result, these trainees can eventually face burnout in their careers (Dyrbye & Shanafelt, 2016; Salana et al., 2020). One positive outcome of the COVID-19 pandemic has been the greater emphasis placed on diversity, equity, and inclusion, in addition to the mental well-being of our learners. While these are not new problems, perhaps more than ever there has been a call to make more deliberate attempts at providing trainees with the support, tools, and space to thrive, not just academically but also emotionally.

Finding Solutions in a Face-to-Face, Hybrid, or Remote Learning Environment

As the health professions student population diversifies, students' learning styles, expectations of teaching, and challenges to learning also have diversified. With each case described, the authors will highlight ways an instructor or faculty member can factor the diversity of today's student body into her/his decision-making for course design, class activities, and student mentoring and support.

SOLUTIONS AND RECOMMENDATIONS

Section 1: Incorporating Flexibility into Didactic and Experiential Course Structure

Case 1.1: Incorporating Flexibility into a Didactic Course

AP is a full-time faculty member who coordinates a traditional, face-to-face, 16-week, lecture-based therapeutics course. The course meets twice weekly for two hours each meeting time. This course is a content-heavy course and requires students to apply their physiology knowledge to learn the basis of therapeutic treatments of medical conditions. AP's Dean and department chair have tasked her with incorporating more flexibility into the course. The course will have 4 hours of contact time each week for a 16-week semester.

How can AP incorporate flexibility into this course?

Solution: Flexibility may be incorporated into a didactic course in multiple ways. Here, we describe ways an instructor may increase flexibility by delivering lectures and activities developed for knowledge transfer asynchronously; varying the modes of content delivery; allowing for student choice in assignment selection (when feasible), and expanding availability for office hours.

Flexibility may be incorporated by recording lectures instead of delivering in-person lectures. Recorded lectures and other asynchronous formats offer several advantages over face-to-face delivery. First, recorded lectures allow students to view recordings at times that best fit into their schedules. This flexibility may be helpful for students who have caregiving responsibilities or who work while attending school. In addition, recorded lectures may be preferred because students can view the recording at their own pace. The student can rewind to hear unclear parts of the recording and review more information about concepts as they watch the recording (Patel et al., 2019). AP has to be mindful that students may spend more time watching the lectures than the actual duration of the recording. For example, a student may spend 60 minutes viewing a 30-minute recording because she/he pauses the recording to take notes or reviews information from other sources to clarify points made in the recording, etc. (based on the author's [T Thomas] personal experience providing learning support to students who had low exam performances in courses that provided recorded lectures). AP should consider providing an estimated time expected for students to view each recording to ensure students balance their efforts across the various recordings. She should also consider dividing her previous hour-long or two-hour long lectures into smaller segments. This approach will help the learner to go back to specific lecture topics more easily. For example, a student will spend more time searching through a 90-minute lecture that covers multiple topics than she/he would spend searching through a 30-minute lecture that covers a specific topic. If you recall, this course is designed to deliver four hours of contact time each week. AP must factor the time for students to view recorded lectures into the course's allotted instructional time. AP should consult with her College and/or University leadership to determine how asynchronous work should factor into the estimated course instruction time.

Another way to incorporate flexibility into this course is to provide multiple methods to deliver content and information; this may include text descriptions, still visuals, and/or animations to aid in her descriptions. Such considerations align with the principles of Universal Design for Learning (UDL) (CAST, 2018). UDL is a framework based on the science of human learning designed to optimize teaching. Incorporating some of the principles of UDL will improve the likelihood that AP can meet the needs of her students' diverse learning styles. For example, AP may provide a recorded lecture to deliver content; such a delivery approach may be preferred for students who like to hear information and see figures. She may also provide that same information in written format for students who prefer to read information.

AP may increase flexibility by allowing students to choose the assignment to be completed, when possible. The authors recognize that some health professions curricula require specific tasks to be completed to ensure development or demonstration of competencies, so providing students with a choice of assignment completion may not be possible. Allowing students to choose an assignment may increase their motivation and confidence (Patall et al., 2010). In addition, offering a choice gives students a level of control to select an activity that best demonstrates their perceived strengths; this autonomy may increase internal motivation and satisfaction (Patall et al., 2010). For ideas for active learning exercises, readers are encouraged to look at activities listed on this website: https://ablconnect.harvard.edu/ (Harvard University's Derek Bok Center for Teaching and Learning). This website is curated by the Derek Bok Center for Teaching and Learning at Harvard University and provides a database of active learning ideas for post-secondary classrooms. The reader may search for activities by activity type, activity goal, subject area, or by time allotted for activity completion.

Finally, expanding times for office hours beyond the traditional 9 am to 5 pm time frame, when possible, and making office hours virtual add another layer of flexibility to didactic courses. Virtual office hours may increase the number of students who meet with the instructor, especially students who work, have a disability (and may have difficulties traveling to attend face-to-face meetings), or have caregiving responsibilities (Barry, 2008; Furman, 2021). Students who may find face-to-face interactions with instructors intimidating may be more likely to use virtual hours because they can interact with the instructor in a more comfortable setting of their choosing (Furman, 2021).

Case 1.2: Revising an Experiential Rotation Designed for Live, Face-to-Face Instruction to a Fully Virtual Rotation

Problem: LL is a clinical educator and preceptor for clinical experiences in an ambulatory care clinic setting. He supervises two learners for 5-week rotations. Before the pandemic, students came to the clinic 3 or 4 days each week. During these clinic days, students collected medical and medication histories from patients, participated in the ambulatory care team meetings (e.g., journal club, continuing education programming, team huddles, etc.), and answered clinical questions from the health care team and patients. During the pandemic, this clinic changed all patient encounters to video and telephone encounters. He now conducts patient encounters via video or telephone calls, and his practice site intends to have him continue conducting virtual encounters for the foreseeable future.

How can LL design his fully virtual rotation to meet the patients' care needs and students' educational needs?

Solution: During the COVID-19 pandemic, many non-essential health care appointments were cancelled, and prior to vaccine development, non-essential medical encounters were conducted remotely, especially for patients with risk factors for serious complications from COVID-19. This shift to remote patient encounters required clinical preceptors to revise their rotations to incorporate students into telehealth practices and engagement in remote patient care.

First, LL should review the goals of his rotation. Rotation goals and rotation syllabi would be available from the University's experiential learning staff. Next, LL should review activities that students completed when his rotation was delivered via face-to-face instruction in the clinic. He should identify activities that may be done remotely via teleconferencing software like Zoom(R), Microsoft Teams(R), or Cisco Webex(R). LL will recognize that activities like journal club presentations, case presentations, topic discussion and in-services may be delivered via teleconferencing software. Such presentations would likely need to be delivered synchronously, but he may explore the option of having students record some of their presentations for others to watch on their own time.

Other activities may be completed by students in an asynchronous manner. Responses to drug information questions for example may be completed asynchronously. In addition, time the experiential students spend preparing for journal club and topic discussions may be completed asynchronously. LL should have synchronous time scheduled to check in on the students' progress on these asynchronous activities. Two of the chapters' authors (Scaletta and Thomas) have found success with adding self-directed learning options. Students are provided with a list of online continuing education recordings and podcasts. Students are expected to complete 2 hours each week of this content and debrief with the preceptor to describe what they learned. Coaching and mentoring interventions may be incorporated into a remote rotation, too. One of the chapter's authors (Thomas) received positive student feedback after adding reading assignments on topics related to professional development and career success. These professionalism readings are followed up by a short debrief between the students and the preceptor.

The approach to engaging in patient encounters may prove most challenging. LL has to decide how he will contact patients for a remote encounter; this may include a telephone call or video conferencing. One positive is that the US Department of Health and Human Services (USDHHS) relaxed rules surrounding data security with telehealth encounters which means LL has more teleconferencing software options (USDHHS, 2020). LL would need to find teleconferencing capabilities that allow him to listen in on calls between patients and his students, such as 3-ways calling. Next, LL will have to coordinate with the information technology staff at his clinical site to get remote access to patient records, and to determine if his students will be eligible for remote medical record access. If students are not granted remote access to patient records, then LL will need to determine how he will share patient information; this means he will need to be versed on the medical center's confidentiality rules.

Fully remote experiential rotations provide flexibility to students and may create opportunities for the preceptor to engage in meaningful non-patient care interactions for mentoring and coaching. A major limitation is that students do not get the experience of being in a physical patient care setting. This includes the student missing out on witnessing interprofessional practice in motion. However, given the successes of telemedicine witnessed during the pandemic, it is likely that telemedicine will continue to expand after the pandemic in the United States (American Hospital Association, 2021). Incorporating telemedicine into clinical rotations will prepare current health professions students to engage in telemedicine.

Case 1.3: Revising an Experiential Rotation Designed for Live, Face-to-Face Instruction to a Hybrid Model

Problem: How can LL design his face-to-face rotation to a hybrid rotation that meets the patients' care needs and students' educational needs?

Solution: A hybrid delivery model, one that has a combination of face-to-face and remote experiences, allows LL to take advantage of the positive aspects of remote and face-to-face clinical interactions and educational experiences. Also, this model allows students to witness first-hand the impact the pandemic has had on clinic workflows, policies and procedures. Developing a hybrid model for clinical rotations may be necessary, as some institutions may limit the number of learners who can be on the premises at any given time.

The logistics of face-to-face experiences will differ post-pandemic. For example, LL will have to ensure that he follows the institution's guidelines about social distancing. In addition, he may have to provide a time gap between patient encounters to wipe down hard surfaces. If LL has two students on one rotation, he may need to require that only one student be in the room with the patient while the other student completes other rotation activities. LL will need to have clear language in his rotation guidelines on donning of face masks and maintaining safe distances from others.

The hybrid model offers flexibility by having students complete some rotation tasks remotely. Students may prepare drug information responses, guideline reviews, and presentations remotely. Moreover, if LL needs to avoid a large gathering of people, he may consider having presentations be delivered virtually in real-time via a teleconferencing platform or recorded for others to view on their own time. A hybrid model will require LL to clearly communicate to students when they are expected to be at the institution and when they may work remotely. In addition, LL will need to carefully plan activities ahead of time to limit the number of times students have to travel back and forth on the same day between the practice site and the remote location. It is especially important to factor in travel time for students who may live far distances from the practice site.

Summary of Section 1 Cases: Students who have engaged in remote learning during the pandemic will likely desire to have the positive aspects of remote learning maintained after the pandemic. Effective use of technology to deliver lectures, offer office hours, and facilitate telemedicine encounters will add flexibility that may improve students' learning experiences and instructors' teaching experiences (McMurtrie, 2021a; McMurtrie, 2021b).

Section 2: Optimizing Learning for Students of Varying Levels of Physical and Mental Abilities, Family Circumstances, and Health Statuses

Case 2.1: Students with Mental Health Concerns

Problem: MJ is a student who always seems distracted by his environment and people. He sometimes asks questions that are irrelevant to the discussion at hand and has challenges with following specific directions when things change. He often misplaces his assignments and submits his assignments later than due dates. When inquired about his repeated late submissions, he discloses that he has been diagnosed with attention deficit hyperactivity disorder (ADHD) and takes medications to control his behaviors and maintain focus.

What steps can MJ's instructor take to support MJ?

Solution: Students such as MJ are not uncommon in this era of raising awareness of mental health especially among students and practitioners of health care (DuPaul et al., 2009). While many students with mental health diagnoses such as ADHD receive treatments for their conditions, research has shown that students with ADHD have lower grade point averages and standardized test scores than other students and that medications alone do not mitigate their deficit in academic achievement (Advokat et al., 2011). When students with ADHD are given extended time for assessments, they use the extra time but their performance does not necessarily increase (Jansen et al., 2019). Furthermore, the students do not always utilize test-taking strategies that were perceived as effective, such as marking words (Jansen et al., 2019). It is important to note that not all students with ADHD experience the same types or degrees of functioning and participation problems (Jansen et al., 2016). The students may experience difficulties with a combination of any of the following: body functions and structures (e.g., concentrating, attentiveness, starting and completing tasks, internal restlessness, motivation, remembering things, sleeping and getting up on time), activities (e.g., study skills, test-taking strategies, problem-solving skills, prioritizing and selecting), participation (e.g., social relationships, accessing social support, negative social behaviors, stigmatized, problems with relationships), environmental factors (e.g., substance use or addictive behaviors, accommodations, external support from peers, parents, and technology), and personal factors (e.g., comorbidities, learning disabilities, attitudes) (Jansen et al., 2016). Thus, a one-size-fits-all type of accommodation such as providing extended examination duration may not be the only resource to help the students who struggle to focus on their tasks. Even without the diagnosis of ADHD or mental health issues, students may experience a tremendous amount of distractions due to virtual communication, social media, and the internet-based global world in which we are living and socializing. Therefore, it is important for instructors to be aware of this trend and be empathetic with the nature of the struggle.

One of the ways an instructor may help students cope with distractions is to be consistent with ways of instructional delivery or assignment submission and make things easy and repetitive. For example, the instructor may consider making assignments be submitted via one mechanism consistently via a learning management system. Some instructors advocate that allowing for multiple different ways of submitting an assignment and giving choices or options for assignment completion allows students to customize their learning activities to align with their learning preferences. While this approach may help some students, this approach may prove distracting for other students. MJ's instructor should discuss with MJ which option MJ prefers - the option to submit assignments in different ways, and having a choice of assignment types to complete, or the option of having the same assignment submission mechanism throughout the course and submitting the same assignment type throughout the course.

MJ's instructor may consider referring MJ to the campus student support services. The student support service staff may be a resource to help MJ devise study strategies and tips to reduce distractions. Student services may also work with MJ to find a tutor. Finally, MJ should contact the student affairs dean/director for additional support. Student affairs deans and staff can help MJ navigate the process for seeking accommodations in compliance with the Americans with Disabilities Act and other campus services designed to support students with diverse neurocognitive abilities.

Case 2.2: Accommodating Family-Related Circumstances

Problem: ST is a second-year professional student and works hard to maintain her GPA to pursue a residency after her health profession degree. She has been showing up late to classes for the past few weeks and performing rather poorly on recent assessments in your course. Her instructor reaches out to her and meets with her to discuss her most recent assessment which she failed. During the meeting, she looks very anxious and discloses that she is 12 weeks pregnant and that she has severe nausea and vomiting that kept her from engaging in schoolwork.

What steps can ST's instructor take to support ST?

Solution: The number of students with health conditions including pregnancy has increased in higher education compared with previous decades because of an increased population of nontraditional students and students of diverse socioeconomic and cultural backgrounds and of varying ages (Brown, & Nichols 2012). With doctoral programs having more women in the past and few students going directly into doctoral programs from undergraduate programs, women students are likely enrolled in their professional programs during their peak family-planning and childbearing years (Wladkowski & Mirick, 2019). While many women felt pressured to choose whether to stay in school or be at home, fewer women forgo parenthood than in the past, and with less stigma (Wladkowski & Mirick, 2019). However, pregnant students may experience difficulty in completing their intended programs and may feel unsupported or inadequate to manage their health, postpartum, and rigorous curriculum at the same time. Lack of flexibility and structural limitations for these students such as group work, attendance to outside programs, or inconsistent schedules and time demands may contribute to the students feeling restricted or incompetent to complete the program. Other issues also include an overall lack of program flexibility, lack of available housing, lack of lactation facilities on campus and the difficulty in obtaining childcare for young children (Brown & Nichols, 2012). Nonetheless, a paucity of research or literature exists to guide how faculty may support students who go through this important milestone in their lives (Brown & Nichols, 2012).

One of the most important elements to supporting pregnant students is to have an advisor or a mentor who understands the difficulty of going through the program while pregnant (Wladkowski & Mirick, 2019). Having a mentor or an instructor with whom the student can share her difficulties and ask for help has shown to positively impact doctoral or professional students by showing empathy, role-modeling, providing guidance and psychosocial support, and instilling confidence and self-efficacy (Wladkowski & Mirick, 2019). In this case, the instructor demonstrated a high level of student-centeredness by reaching out to ST. ST was comfortable disclosing her pregnancy status, so she may feel that she is in a safe space with the instructor. The instructor should recommend that ST visit the dean of student affairs who can help ST with identifying steps to take to request accommodations during her pregnancy and a leave of absence postpartum. The dean of student affairs can also assist with communicating ST's leave to all of her faculty, which takes the onus from ST to coordinate communication. ST may also be provided with available resources for working mothers such as the availability of on-campus childcare facilities or if the campus has discounted rates for area childcare facilities. If there is a lack of such resources for pregnant or parent students, the institution should review their student support policies to determine gaps in their resources and implement a new structure and policy to help this unique student population.

In this case, the instructor's first instinct may be to offer ST options for flexible assignment submissions and grace periods for late arrivals to class; however, this plan must be discussed and coordinated carefully because creating such flexibility for one student and not others may cause unintended inequities and resentment. The instructor and the student should have a discussion about how the semester or the academic year would unfold and if the student wishes for or expects any specific accommodations for seating, being excused in class for maternity visits to the doctor, or scheduling assessments around her medical leaves. If there are any semester-long projects, the student may be given an option to submit it or receive feedback around the time when she might be on a short-term leave. Offering a virtual learning option during the latter part of the pregnancy may be an option if the student wishes to complete her course throughout the pregnancy and post-partum.

During the conversation, it is important to provide an atmosphere of genuine care, empathy, and concern as opposed to disability-driven, reluctance, or conditional suggestions, which may evoke resentment or failure from the student. As faculty are not formally trained to manage students with disabilities and varying health circumstances, it is important for the institution or the program to provide such training to faculty or at least provide guidance on how and whom to contact in these circumstances. Ultimately, it is prudent to refer ST to an administrator who coordinates student services and who can help ST weigh her options for continuing in the program or taking a leave of absence. Such decisions will have financial consequences that student services administrators are equipped to navigate.

Case 2.3: Students with Physical Disabilities

Problem: KM is a fourth-year professional student and excited to begin her clinical rotation at a nearby community hospital. She had polio when she was young and is not able to walk without a wheelchair or a set of crutches. One the first day of her rotation, she met her preceptor and a few other students at the hospital lobby and took a tour of the hospital including the inpatient unit where she would be rounding with her preceptor for the next four weeks. After the first day, ST is exhausted from walking and using crutches all day. She is worried about not being able to catch up on her work at this rate and being compared with other students on her performance. She also found a few areas in the hospital where it was difficult to walk in and out of the rooms or bathrooms without a significant effort.

What steps can KM's instructor take to support KM?

Solution: It is important to recognize that not only is KM experiencing the obvious physical disability but also emotional and psychological burden because she is worried about her performance and competence at her rotation being compared with students who do not have the same issues. Her concerns may be subconscious or self-perceived; however, it may also be borne out of her previous experiences of dealing with others' perceptions, attitudes, and treatments toward her or her disability. Given this background, it is critical for the preceptor to assure her that (1) KM's learning will be accommodated with any support necessary to ensure she feels fairly treated as a learner, (2) she may ask for an additional help or accommodations, with a certain level of confidentiality, on her assignments if her physical disability negatively affect her learning, and (3) she should be encouraged to bring to the preceptor's attention any assisted devices or technologies that can be helpful for learning. This assurance is one of the most important factors contributing to a student's success; the comfort and understanding can bring about their best performance in a non-intimidating manner (McClelland et al., 2015).

KM may assume that it is necessary to be present in person at the hospital for all the rotation activities; however, presentations, journal clubs, case debriefing, or pre- or post-rounding can be done virtually in a setting where she can be seated or even at home. She may need to come in only for the time when she needs to check on her patients in person but complete a majority of the work outside the hospital or in a sitting area with a computer. One of the most important factors to achieving student success during this emergent time is to provide support and resources to overcome the initial challenges of transition. This may include not only the technological support but also advising for psychological and emotional burden that the students with disabilities may experience.

Case 2.4: Students with Disabilities in English Language and Communication

Problem: WR is a first-year medical student and an international student from Indonesia. He is brilliant and hardworking as he graduated from one of the top universities in his country before coming to the U.S. However, his grade was falling behind after the first semester in the pharmacy program which has a rigorous curriculum consisting of team-based, problem-solving assignments and presentations. He also missed a few meetings and assignments which were not specifically noted or written in the learning management system. At a meeting with his advisor, he shared his thoughts about quitting the program and returning to his country of his lack of confidence in understanding and communication in English as well as he initially assumed at the matriculation. He also confessed that he missed his family back home during the pandemic.

What steps can WR's instructor take to support WR?

Solution: Students who do not speak English as their native language have additional barriers to learning. Only in the late 1980's did the research and interest in this subpopulation of learners begin to surface in the United States although it has had one of largest immigrant populations in the world. (Fitzgerald, 1995). However, students who speak "English-as-a-second-language (ESL)" are not necessarily immigrants. Per the federal government's definition, ESL may be applicable to those who were not born in the United States, have native languages other than English, come from environments where English is not dominant, or are American Indians or Alaskan natives whose English proficiency levels affect their learning (Fitzgerald, 1995). ESL learners' cognitive reading processes were quantitatively different from those of the native readers, especially in speed and depressed activation of selected processes (Fitzgerald, 1995).

Healthcare professional students who are ESL learners have an added difficulty with learning because of the technicality of the contents and words used in medical care. However, this language barrier is more complex and reaches beyond just academic performances for ESL students. Malau-Aduli found that international medical students had concerns about not only language problems but also cultural adaptation, academic adjustment, and lack of support system (Malau-Aduli, 2011). This is not due specifically to the English language itself as the concerns are similarly overarching in other cultures; a qualitative focus group study from Germany found that international medical students were most concerned about encountering problems and social exclusion due to language deficit and intercultural differences (Huhn et al., 2016). During the pandemic or emergency situations, this anxiety and worries about uncertainty as well as lack of human connection via in-person support may escalate and play a detrimental role in academic performance of these students.

To guide international medical or health professions students, it is important to identify the root of their core concerns or academic issues; the issues may be related to family, relationship, physical ailment, or mental health that are not particularly different from any medical student. (Schiller et al., 2018). The students may cope with such problems actively by seeking social support and problem-solving the issues on their own. However, if the cause is due to the language or cultural barriers to learning, the program or the faculty needs to prepare a plan to assist them with tangible and consistent support. As supportive measures, international medical students identified the following as helpful: communicating with senior international medical students, church or pastoral care, assistance from the office for international students and academic staff, other peers in the same class, tutorials, family and friends, holidays (downtime) (Malau-Aduli, 2011).

Some of the recommended supportive measures for international medical students include (1) preparing pre-arrival information package with tips on the weather, dominant culture and lifestyle of the country/region, (2) programmatic resources such as an office of international student office with any registration, learning management system-related or financial support, and communication trees (emergency or not) (3) orientation activities with guided tours, peer mentors, extracurricular organizations, spiritual care availabilities, and (4) tutoring and workshops, and shadowing availability. All of these should also be readily and more prominently available via virtual methods in a pandemic, or hybrid learning environment (Malau-Aduli, 2011).

Given that WR expressed his emotions about missing his family and seemed discouraged about his academic progress, it would be important to discuss his academic performance in the context of his support system first, such as lack of or issues with friends, peers, mentors, or relationships. This interviewing, to the extent possible, rules out any negative contributory factors so any directive and technical support can be meaningful and effective. To address the language-related issues, it is important to ensure the availability of the internet connection, knowledge and skills in navigating the learning management system, awareness and availability of tutors, writing centers, and peer mentors of similar background would be critical to supporting WR. The faculty involved in teaching WR or any international students should be educated about the additional stress that these students face especially during pandemic periods, and should be able to support or refer them to appropriate channels of the program to ensure the students are provided with similar learning tools and environment as others.

Summary of Section 2 Cases: Assisting and advising students with physical or psychosocial concerns can be successful when multiple and appropriate resources are involved to take care of them. There is no one-size-fits-all approach to helping students with these issues; thus, faculty needs to be flexible and provide an atmosphere of genuine care, empathy, and concern to the situation so that the student may be able to move toward their successful academic outcomes. The supportive measures include but are not limited to the campus student support services, student affairs dean/director for additional support, disability support services, financial services officers, campus IT support, writing center, spiritual services, and student life directors, as well as faculty. These individualized support efforts will help with minimizing the psychological and emotional burden that the students with disabilities may experience.

Section 3: Supporting Students' Non-Cognitive and Psychosocial Needs

Case 3.1: Shaken Confidence in an A Student

Problem: LJ is a nursing student who is accustomed to getting A's in all his courses and takes his grades on all assignments very seriously. During a clinical rotation in internal medicine, he was assisting a patient into a wheelchair when the patient all of a sudden mentioned they felt like their blood sugar was low. LJ instinctively brought the patient orange juice. A nurse supervisor entered the room and upon seeing the patient drinking orange juice became irritated at the student. The patient was on his way to have an endoscopy and needed to have an empty stomach before the procedure. The patient now had to have the procedure postponed until tomorrow, extending his hospital stay. The nurse was visibly upset at the student the rest of the day, and he could hear the nurse venting to another co-worker about the situation. At the same time, the patient expressed gratitude for LJ for "being the only one who cared" in that situation. LJ was unsure if he made the right decision, and for the rest of the rotation he harbored feelings of anxiety, inadequacy, and poor confidence. The weight of these feelings made him second guess himself often, and he made more mistakes he normally wouldn't have made. He felt like an intruder to the nursing staff and began to question if his grades were an accurate reflection of his readiness to be a competent nurse. When he received a B on this rotation, he took that as confirmation that he was not as capable as he originally thought.

- What could be done to help LJ work through these negative feelings and restore his confidence?
- How can faculty prepare students like LJ to address difficult and uncertain situations before they arise?

Solution: Students often rely solely on grades as validation of progress in their training and how successful they will be in practice. This is especially true in a virtual learning environment where other forms of validation may not be as easily encountered compared to in-person settings. LJ seems to be experiencing a disconnect between his grades on didactic material and his performance in a real practice setting. As a result, he is experiencing many of the feelings consistent with imposter syndrome.

While there are few ways to prevent a trainee making a mistake or experiencing a conflict with another co-worker in experiential training, there are several ways to help prepare students to handle clinically uncertain situations. First, a learning environment that is caring, positive, and supportive has been shown to minimize feelings of inadequacy and help learners bounce back from adversity (Amsurd et al., 2019). To create this culture virtually, trainees must be able to feel respect, support, and caring through all interactions with faculty. Students can, for example, sense tone in written communications and can apply the perceived tone to their sense of self-worth. Therefore, when providing written feedback, faculty should make deliberate efforts to focus on positive feedback in addition to constructive feedback. When noting areas of improvement, faculty should shift away from "shame-based" learning and take care to avoid language that seems cold or blunt (Villwock et al., 2016). If LJ had received regular and timely feedback that was supportive and showed genuine caring, he may have entered the experiential rotation with more resilience and have been better able to accurately gauge where his skills are instead of relying solely on grades.

Secondly, students should receive ample practice in handling situations that are clinically uncertain, in other words, situations with no clear cut "right" answer (Ledford et al., 2015; Reis-Dennis et al., 2021). This can be accomplished virtually by presenting students with an ambiguous case and then allowing students to debate amongst themselves. A faculty-led debriefing session can walk through the pros and cons of each solution the students developed while emphasizing that students can feel comfortable without a clear cut best solution. A successful example of this was an interprofessional education experience that led students to navigate the early stages of the COVID-19 pandemic (Crawford et al., 2020). Instead of focusing on the fear that can come with uncertainty, the learners were encouraged to embrace it and view it as a learning opportunity. They hypothesized incubation periods and modes of transmission, and predicted epidemic curves based on the information that was available at the time, which gave them a sense of control over the precarious situation. Having adequate practice in confronting uncertainty might have equipped LJ with the resilience and comfort level needed to address his patients after making his initial error instead of second-guessing himself.

Preparing for situations is one thing, but actually experiencing these difficult situations is another. LJ should feel he has someone to turn to for advice if he continues to struggle after a challenging experience. A structured mentoring program would ensure that all learners have access to a trusted member of the profession who has experienced and overcome the same struggles. Virtual conferencing opens up more opportunities to connect with mentors that were previously less available to meet in person. A great mentor for LJ could be a past student who struggled with grades but is now successful in their career. This mentor could guide LJ on navigating the emotions he is feeling and to rely less on his grades for validation of his potential for future success.

One-on-one mentor meetings can be supplemented by group mentoring. Group mentoring can provide a more casual environment for students to get advice from those who have "been there". Students can submit questions ahead of time to get the most out of the mentoring session (Gernet et al., 2020). Peer mentoring can also be a more casual and less intimidating medium for students to get the advice they need. Sharing common experiences with each other creates a sense of "survivor's pride" and camaraderie (Amsurd at al., 2019).

An open discussion about dealing with conflict and making mistakes can also help students prepare for emotionally challenging situations. LJ's feelings of inadequacy and anxiety may have been perpetuated by the thought that what happened to him was unique. Oftentimes, students keep their emotions private, fearing they will appear weak or that they are the only ones dealing with these feelings. By providing a forum for learners to openly discuss their emotional struggles, students may not feel so alone or isolated when these situations occur. In this setting, LJ could receive coaching on how to turn this negative experience into an opportunity for growth instead of shame. This would allow him to self-reflect so that he can become more self-aware of his emotions and how to handle them in the future. These strategies can be done in a live, online format. A virtual setting may also allow students to anonymously share their struggles, which would be more difficult to achieve in an in-person classroom. No matter the format, by honoring learners' struggles and vulnerabilities, they will feel safer and able to seek help when problems occur (Amsurd et al., 2019).

A formalized co-curricular program can develop important life skills necessary to handle hardship and anxiety. Skills such as resilience, self-efficacy, and grit seem to be determining factors in one's ability to handle the challenges that are inherent in daily health care practice (Amsurd et al., 2019; Villwock et al., 2016; Savitsky et al., 2020; Kunzler et al., 2020), such as the situation LJ had experienced. Having these abilities allows trainees to turn negative experiences into opportunities, learn from demanding situations, react appropriately to adversity, and to recover from these setbacks. Dedicated training programs in these life skills are available in virtual live and asynchronous formats. Additionally, virtual emotion sharing as discussed above can be incorporated into co-curricular training. When students are given the opportunity to navigate their feelings of self-doubt and accept validation from their own peers and instructors, their self-esteem grows and feelings of anxiety, isolation, and imposter syndrome diminish (Persky, 2018).

Case 3.2: The Post-Graduation Unknown

Problem: YU was always told that she would have plenty of time during pharmacy school to figure out what she wants to do with her career after graduation. However, she is in her 8th and final year of her training, and still has no idea what she wants to do. She has many varied interests and could see herself being happy doing many things. She also feels financial pressure, as she has student loans to pay and her mother and sister both lost their jobs due to the COVID-19 pandemic, and she feels they are relying on her. She mentioned that with all of the "problems of the world", it is hard to feel excited about joining it without support and guidance of the academic community that she has become so accustomed to. She wants to make a positive difference, but she doesn't know how to. In all, she says she is just "overwhelmed by what to do with my life".

- What are some resources and sources of support that can be made available to help guide YU during this transition period?
- What are strategies to prepare students like YU for commonly encountered problems while entering the workforce?

Solutions: The uncertainty of the world is felt perhaps no more immediately than to soon-to-be graduates. The crisis of the pandemic and the health care system's struggles with meeting its demands only further potentiated this sense of unpredictability for trainees who were about to enter the world of health care. To add to this, political strife, economic decline, job instability, and the spotlight on racial inequities forced students to question where they belonged in this ever-changing and problem-filled world. It is no wonder why YU is feeling overwhelmed; she is trying to figure out who she is when it seems the world has yet to do that.

As mentioned in the previous case, mentorship is key in providing the kind of individualized guidance that YU needs. Mentorship helps to combat feelings of anxiety, uncertainty, and disconnect (Abdelhamid et al., 2020). However, with any successful relationship, a good match is important. In the past, options for mentors may have been limited, and the role of mentor has been traditionally served by members of the teaching institution. However, with the recent surge of virtual conferencing tools, there are no longer geographic bounds to who that mentor could be. Virtual formats of mentoring have been shown to be just as effective at establishing interpersonal relationships as traditional face-to-face mentoring (Gernet et al., 2020). YU therefore now has accessibility to mentors who otherwise could not meet with her on campus, such as members of professional organizations, leaders in the community, or alumni. A directory listing available mentors and their areas of expertise can be helpful in connecting students to the right mentor. YU would benefit from meeting with mentors who work specifically in fields she may be interested in, but she could also benefit from meeting someone who has changed career paths throughout their professional life. The latter mentor can be key in dispelling the myth that YU must make the "right" career choice right now.

There should be dedicated time devoted to career counseling as students approach graduation. To introduce students to various career paths, panel discussions, round table events, and networking opportunities can easily be conducted through virtual conferencing tools. These outlets will allow YU to get more specific information about the career paths she is leaning towards. Recruiting events and informational sessions on job searches, post-graduate training, employment opportunities, interviewing skills are also helpful strategies (Church et al., 2019). In YU's case, a post-graduate training opportunity with a variety of specialty learning opportunities may be worth exploring, as it will give YU the additional experience she needs to decide on a career path.

The transition from trainee to full-fledged practitioner can be a turbulent time, commonly known as "practice shock" (Weurlander et al., 2019). Often, practice sites lack availability and time for structured mentorship for new workers, so new practitioners are managing these burdens on their own. YU seems especially concerned that she won't be able to readily turn to the support systems she has relied on through her academic training. Those final days before graduation are therefore opportune times to prepare trainees for this transition period. A structured program that acknowledges and confronts commonly encountered challenges in the workplace will set realistic expectations for students when they enter the workforce. Trainees will also feel more empowered to advocate for their needs and seek support when they begin their job (Weurlander et al., 2019; Walker et al., 2019). This will be key to preventing burnout and promoting job longevity.

Another key factor in preventing burnout is engagement in self-care practices. Co-curricular programs that emphasize the importance of self-care and wellness can set trainees up for lifelong practices that can help shield practitioners from the burdens of worklife. Programs that encourage and give credit to learners for engaging in activities that nurture the body, mind, and spirit have been shown to decrease depression and burnout. One successful program that took this approach rewarded trainees with points that they could use towards earning credit on their transcript. Students could choose their self-care activities, and they documented their practice through selfies, and submitting their stories and artwork in a student-run journal on wellness. Participants reported strengthened relatedness to others, resilience, and professional competence, all traits that would set YU up with more confidence in setting out on her career journey (Salana et al., 2020).

A common factor that students prioritize when making career decisions is their current financial state. Many students like YU may feel added pressure to support their family financially, and this may drive their post-graduate decisions. Providing students with opportunities for financial counseling, including building credit, student loan repayment options, retirement planning, and saving might give students the confidence to make less pressured career decisions.

Case 3.3: Inequities in Virtual Learning

Problem: AR is a third-year medical student at an institution that has decided to continue with a hybrid of in-person and online learning during the second year of the COVID-19 pandemic. She is the first of her family to go into the medical field, and her family has made many financial adjustments to help fund her education. While most of her classmates are Caucasian, AR is from a Hispanic background. While many of her peers seem to her to be very self-assured and carry themselves with confidence, AR identifies as an introvert and is often intimidated and wonders if she belongs in this profession. Clerkship supervisors consistently tell her she needs to speak up more and be more confident. She already has difficulty with this, but virtual learning has made it more difficult for her to engage and connect to her peers and teachers. She is at home with her younger siblings who are also virtual learning, and thus the internet connection is very choppy. She is often distracted at home by her loud siblings and her parents' expectations that she help out with maintaining the household and caring for the children. All of these have greatly contributed to her stress and anxiety, and she feels that none of her peers have it as hard as she does.

- How can the instructors adjust their online teaching methods to better include and engage all students, and not just students with the best access to resources?
- What steps could AR's learning institution take to ensure equity in learning opportunities for its students with diverse backgrounds and needs?

Solutions: As discussed previously, the lack of diversity in students and trainers is a pervasive problem in health care professions. Efforts should be made to recruit students and faculty of diverse backgrounds, even if these efforts must be done virtually (Ojo & Hairston, 2020; Chaudhary & Berhe, 2020). Students like AR may feel less isolated and believe that they belong in healthcare if they had more peers or teachers who came from a similar background. Diversifying the healthcare field will take time, so deliberate actions should be taken to provide an environment of inclusion and equity for already existing students from varying backgrounds. An initial and vital step is adequate training of faculty and staff on the topics of diversity, equity and inclusion (DEI) (Harrison-Bernard et al., 2020). These trainings should occur regularly and allow instructors and staff to reflect on problems with DEI and implicit bias within their own programs and treatment of students (Bao et al., 2020). Training on inequities seen in online learning, for example, should be required prior to faculty designing virtual learning experiences.

Students also need education on addressing issues with DEI within the medical field. Creating an outlet where students can express their concerns with lack of DEI in healthcare sends a message that the institution cares about these issues and educates students to the problems faced by their fellow peers. Virtual workshops can train learners on how to recognize and respond to microaggressions, implicit bias, and inequities (Acholonu et al., 2020; Sandoval et al., 2020; Davis et al., 2021). Additionally, when choosing or creating course materials, be sure to include diverse perspectives and examples.

The COVID-19 pandemic highlighted problems with inequities that exist among college students, namely those from low-income and underrepresented backgrounds (Mann et al., 2020). Like AR, these students are more likely to have unreliable technology and work spaces. Learning and engagement suffers as a result. Teaching institutions should consider different actions to provide equal access to high quality education for all its students. Examples of this can include supplying borrowed computers, investing in resources that can be provided for free to students, or creating a fund to help students who lack resources. For those who do not have adequate work spaces or internet access, opening campus libraries and residence halls to those in need in a socially distant manner can be a creative solution (Mann et al., 2020). Keeping a constant line of communication on the challenges of virtual learning, such as surveying the students on their concerns and needs, encouraging dialogue about the experience of virtual learning, and asking for anonymous feedback about the virtual learning climate can be helpful in collecting data on how best to accommodate all learners.

Being adaptable and allowing students multiple options on how to access content with virtual learning can also help address inequities faced by students. For example, if providing videos, consider also providing a PDF version of the same content, since videos take up more internet bandwidth. Asynchronous pre-recorded videos would allow AR to view the lecture on her own time when the house is quietest. The use of podcasts, clinical cases, and problem-solving practice has also been successful in developing important skills in an asynchronous manner (Mann et al., 2020). Being flexible with due dates may also be appropriate for students who have additional stressors that make deadlines difficult to meet.

Still, synchronous gatherings of students are necessary to keep them actively engaged with their peers and allay any feelings of isolation. Social isolation impacts those from underrepresented populations the most, which in turn impedes professional success compared to those who have a more solid social and professional network (Moreno et al., 2021). Creating virtual student-led teaching or interest groups have been successful in helping students feel connected to their peers (Mann et al., 2020). For example, perhaps a student-led virtual studying group that caters specifically to those with distracting homes would help AR not feel so alone in her struggles and provide much needed peer-to-peer support. Virtual mentorship, as discussed in the previous case, will also be vital in keeping AR connected to the profession in which she is training (Moreno et al., 2021).

Students with diverse personalities and learning styles should also be considered when trying to create a learning environment that is considerate of all students. AR has a difficult time participating during synchronous discussions due to her lack of self-confidence and her introverted nature. Setting clear expectations in online discussions can encourage equal participation. This can include setting online etiquette guidelines that foster inclusive online classrooms. During small group discussions, for example, students can take turns in an order that is arbitrary (e.g. alphabetical, by birthdate, etc.), with each student having an equal amount of time to speak with no interruptions. Giving students a set time period to think prior to the discussion would give time for AR to formulate a response that she feels confident in. Another idea is to solicit anonymous contributions to help encourage engagement without fear of judgment. If non-anonymous discussion points are collected prior to class, responses can be displayed anonymously. In this case, a deliberate effort to show every student's response at some point during the course would help to validate students like AR and give every student an equal voice in the class.

Finally, student support services with a focus on equity are crucial in assisting our most marginalized students. Mental health services and student affairs staff ideally should be diverse, but at minimum should be competent in addressing the needs of a diverse and varied student population. All faculty should be aware of the services available and feel confident in referring students to these services as needed. For example, referring AR to a campus counselor she feels comfortable with may help her cope with the psychosocial barriers to her learning.

Summary of section 3 cases: As we prepare our students to enter the healthcare field, we must consider not only their knowledge and skills development, but also the development of non-cognitive skills that are vital in leading a fulfilled career and life. Supporting our students to address feelings of uncertainty can come in the form of one-on-one mentorship or institutional support services. In addition, recognizing that not all students have equal access and opportunity for quality education is the first step in making much needed progress to provide equitable training for all students, no matter the teaching environment.

FUTURE RESEARCH DIRECTIONS

During the pandemic, colleges and universities had to make major shifts in course design and delivery as well as implementation of student support services. As the world moves into a post-pandemic status, students may expect their curriculum to continue to include some of the positive aspects of their pandemic curriculum experience. For example, students may expect more options for course delivery, such as hybrid course delivery models, or seek guidance on how to manage their physical or mental health while completing their course or program. Instructors have to keep abreast of student preferences and expectations in the post-pandemic world and align their course delivery formats and teaching and mentoring styles with these expectations. Future research directions will include comparing the effectiveness of hybrid course delivery to traditional, 100% face-to-face course delivery, as well as using different learning modalities for students with mental or physical disabilities. The validity and fidelity of remote assessments, including the technology needed to support remote assessments, warrants investigation.

CONCLUSION

This chapter explored the connection between diverse health professions student demographics and a wide range of challenges that these students faced pre-pandemic and during the pandemic. The authors offered ideas to help instructors navigate student challenges that may have been exacerbated by remote learning. In addition, the authors offer their informed hypotheses about changes students may desire in their post-pandemic coursework and relationships with their instructors. Faculty will be ready for to help students navigate their health professions educational experience if they approach them with a willingness to embrace new teaching methodologies and assume roles beyond that of a teacher, including the roles as a mentor and career coach.

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KEY TERMS AND DEFINITIONS

Asynchronous Learning: Learning that takes place when the learner and the educator are not in the same physical or virtual space at the same time. Examples include having the learner watch a recorded lecture and the educator is not online or in the classroom watching the lecture at the same time with the learners. Use of virtual discussion boards are another example of asynchronous learning because the learner and the educator do not have to be on the discussion board at the same time.

Diversity: The involvement of people from varied backgrounds, including different races, ethnicities, cultures, genders, socioeconomic backgrounds, sexual orientation, health status, and personalities. Often combined under the broader heading of diversity, equity, and inclusion which may be abbreviated as "DEI."

Equity: Fair treatment of people so that not one person or group has any more advantage or disadvantage compared to another person or group. Often combined under the broader heading of diversity, equity, and inclusion which may be abbreviated as "DEI."

Hybrid Course: A course delivered with a combination of in-person learning activities and on-line learning activities.

Imposter Syndrome: A belief that one's accomplishments are not actually deserved despite having the knowledge, skills, and abilities to achieve them.

Inclusion: The practice of allowing all members of a community to be involved. Often combined under the broader heading of diversity, equity, and inclusion which may be abbreviated as "DEI."

Person With a Disability: A person who has a physical or mental impairment that substantially limits one or more major life activities, including learning.

Psychosocial Factor: Components of one's social life and psychological needs that impact one's behavior and how they are treated.

Remote Learning: Learning that takes place when the learner and educator are not in the same physical space. Remote learning may be synchronous (learner and educator are in the virtual space at the same time) or asynchronous (learner and educator are not in the virtual space at the same time).

Synchronous Learning: Learning that takes place when the learner and educator are in the same physical or virtual space at the same time. Traditional classroom teaching is synchronous learning because the learner and educator are in engaging in the learning activity at the same time. An on-line class session that takes place on a digital conferencing platform like Zoom®, GoToMeeting®, or Microsoft Teams® is an example of a virtual synchronous learning activity.

Chapter 5
Reshaping Pharmacy and Allied Health Education for a Post-Pandemic World Using Kotter's Change Model

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ABSTRACT

The COVID-19 pandemic brought unprecedented challenges to higher education. The extraordinary challenges created by the pandemic required equally extraordinary efforts from faculty and other stakeholders to rapidly convert face-to-face classes to online/hybrid instruction. This rapid change was facilitated by use of a robust framework for not only making changes in short order but also sustaining the changes to reshape healthcare education for a post-pandemic future. To this end, the chapter discusses the effective use of Kotter's 8-step framework to successfully implement change in healthcare education at a college of pharmacy and allied health professions. This chapter discusses each step of Kotter's 8-step process to create, implement, and sustain change in pharmacy and allied health education. The model integrated people, processes, and effective strategies to create changes amid the pandemic (crisis). Lessons learned and implications for the future in a post-pandemic educational environment are presented.

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INTRODUCTION

Healthcare education is a team effort involving several stakeholders. However, faculty are at the very core of driving change and innovation in healthcare education. The extraordinary challenges created by the COVID-19 pandemic required equally extraordinary efforts from faculty and other stakeholders. Faculty had to convert their face-to-face classes to online/hybrid instruction in a matter of days to weeks, which normally takes months or years to implement. This level of transformation requires a robust framework for not only making changes in short-order but also sustaining the changes to reshape healthcare education for a post-pandemic future. To this end, the chapter discusses each step of Kotter's 8-step framework (Kotter, 1995) to create, implement, and sustain change in pharmacy and allied health education. As shown in Figure 1, Kotter's model was utilized during different phases of the COVID-19 pandemic starting from crisis management to implementing short-term and long-term changes. The changes were operationalized by integrating people, programs, and processes (3P framework, Figure 2). More importantly, the model will be used to sustain the changes beyond the pandemic. Although this chapter specifically focuses on the use of Kotter's change framework for pharmacy, medical laboratory science, respiratory care, and public health education, the strategies discussed in this chapter can be broadly applied to create, implement, and sustain changes in other healthcare professions.

BACKGROUND

Change is a constant in every industry for it to be sustainable, and higher education is no exception. A continuous need exists for transformational changes in higher education to meet rapidly changing demands, including new instructional approaches to achieve learning objectives. However, change is often slow and incremental in higher education institutions compared to commercial organizations. This cautious approach to transformational change in higher education can be attributed to intricate governance structures, tenure-systems, planning processes, and overall culture (Boyce, 2003; Kezar, 2011). Further, given the rigid organizational structures with divergent objectives, the coherent response required for major change at the institutional level is often challenging. Although increasing enrollment and budgetary pressures have led to increased efforts for institutional changes in higher education, success has been limited (Kezar, 2011). This can be attributed to ineffective leadership, faculty resistance to change, budgetary constraints, public scrutiny, conflicting values, and conservative institutional traditions (Klempin & Karp, 2018). To this end, there is a need to develop an effective framework to overcome these barriers and advance transformational changes in higher education.

Several practice theories have been proposed for the implementation of organizational change. Examples include teleology (planned change), life cycle (regulated change), dialectics (conflictive change), and evolution (competitive change) (Van de Ven & Sun, 2011). Of all the models, the teleological models (top-down) have been popular outside of higher education due to their linear process and clarity in vision and goals. However, application of these models in higher education is challenging due to faculty autonomy and shared governance structures. Therefore, modified versions of teleological models have been implemented to bring change in higher education.

In 1995, John Kotter introduced an 8-step change model to lead sustainable transformational change in organizations (Figure 1; Table 1) (Kotter, 1995). Although Kotter's model of change presents itself as a teleological top-down approach, the eight steps can be applied iteratively by engaging stakeholders at every level to achieve effective change. In the context of higher education, the faculty play a central role in planning and execution of Kotter's 8-step model.

The eight steps in Kotter's model of change are outlined below (Kotter, 2012).

Step 1: Create a sense of urgency. Individuals and teams get motivated for change when they see a clear and urgent reason to do so. To this end, it is important to articulate the current reality and prospects as clearly as possible to generate motivation for change.

Step 2: Build a guiding coalition. Change requires a coalition of internal leaders with the right knowledge, skills, and passion for the cause (Fisher & Henderson, 2018). For effective culture change in academia, this coalition must include faculty along with administrative leaders such as deans and department chairs (Bystydzienski et al., 2017). Creating a strong internal coalition and leveraging their external relationships is a necessary step in the change process.

Step 3: Form a strategic vision and initiatives. A clear statement that defines the vision of the future and how the organization can achieve that vision is essential. The initiatives implemented to drive change need to be carefully matched with the vision and goals.

Step 4: Enlist a volunteer army. The vision must be communicated effectively to achieve buy-in from stakeholders to move them in the direction of change (Besterfield-Sacre et al., 2014). In academia, this involves engaging all of the relevant stakeholders – faculty, staff, and students as well as external stakeholders – to build the momentum to move forward.

Step 5: Enable action by removing barriers. As described above, institutions of higher education often have many barriers to transformational change. This is further complicated by unique challenges to change in specific departments and educational teams. Removal or minimization of these barriers is critical for implementing the change.

Step 6: Generate short-term wins. Generating and recognizing/celebrating small wins gives people emotional rewards, a justification for their efforts and short-term sacrifices, reduces resistance to change, and motivates them to accelerate the change process.

Step 7: Sustain acceleration. With the motivation and credibility generated through small wins, the movement for change can be accelerated until the vision is reality. Without relentless acceleration, stakeholders may lose their sense of urgency and retreat to old methods (Kotter & Cohen, 2002; Kotter, 2012).

Step 8: Institute change. Change is about building a new culture. Culture is the manifestation of shared values and behavior. By connecting the change process to organizational success, the culture can be changed long-term to sustain the changes made.

As described above, Kotter's model emphasizes intentional stakeholder engagement to guide transformational change in higher education (Kang et al., 2020). There are several examples of successful application of Kotter's change model in higher education in general and health education in particular. Wentworth and colleagues (2018) utilized Kotter's model to change a teaching evaluation system. The successful change of the teaching evaluation system was accomplished by creating a coalition army of enthusiastic faculty and a transparent process for communicating the change, vision, and strategies. Guzmán and colleagues (2011) used Kotter's model to change the assessment of clinical outcomes in a dental program. The authors utilized continuing education credits for participating faculty as an incentive and piloted the model before expanding the new assessment method to the entire program. Similarly, Kotter's model was used in a school of medicine to implement changes in teaching and evaluation of professionalism in the curriculum through faculty development (Steinert et al., 2007). A climate assessment survey that showed a culture of dissatisfaction, distrust, and disrespect was used to create a sense of urgency for changing the culture in a nursing college (Springer et al., 2012). This nursing college used Kotter's model to make longitudinal changes to the culture over an eight-year time period, resulting in high employee satisfaction and trust. This study further emphasized that changing institutional culture takes significant time.

The COVID-19 pandemic created unprecedented challenges and urgency for change in higher education institutions. At the same time, these challenges also presented new opportunities to develop and implement long overdue changes in healthcare education and practice. For example, colleges and schools of pharmacy responded to the pandemic in both helping the community in testing and vaccination efforts and initiating change in pharmacy education and training models (Brazeau, 2020; Brazeau et al., 2020; Engle, 2020; Mirzaian & Franson, 2021; Romanelli et al., 2020; Sorensen et al., 2020). To this end, Kotter's model has been applied to make changes in healthcare education in response to the pandemic. Weiss and Li (2020) used Kotter's model to guide changes in a pediatric medical residency program during the pandemic. Using the current pandemic as an accelerant for change, a digital transformation of pharmacy education has been implemented by utilizing Kotter's model (Mirzaian & Franson, 2021). As institutions plan for a post-pandemic educational environment, it will be critical to examine the outcomes and sustain successful changes for reshaping healthcare education.

At the authors' institution, Kotter's model was used iteratively to guide change in pharmacy and allied health professions programs during the COVID-19 pandemic. Figure 1 illustrates how the steps in Kotter's change model aligned with the approximate timeframe for implementation. It should be noted that due to the iterative nature of the change process some steps were conducted simultaneously and that steps needed to be revisited as circumstances changed. For example, a vision was developed, communicated, and implemented in the initial transition to online education in spring 2020. The same steps had to be repeated over the summer as programs transitioned to a hybrid approach for the fall semester. Active involvement of faculty has been one of the critical factors for change in many of the studies of Kotter's model in higher education. The approach described in this chapter emphasizes a faculty-driven approach to change. Kotter's model was combined with the 3P framework (People, Program, and Processes) and the 3C framework (Communicate, Connect, and Collaborate) to guide the change (Table 1; Figures 2 and 3). This model will continue to be used to sustain changes in a post-pandemic world.

IMPLEMENTING KOTTER'S FRAMEWORK TO GUIDE CHANGE

Laying the Groundwork for Change – Steps 1 and 2 of Kotter's Change Model

Steps 1 and 2 of Kotter's framework are to create a sense of urgency for needed change and establish an initial coalition of stakeholders to guide the change process. The COVID-19 pandemic necessitated an abrupt switch to distance learning for traditional in-person programs throughout the world. The extremely short time frame for the changes fueled the sense of urgency to become familiar with online teaching approaches and technologies for immediate implementation. This urgency also underscored the need for structures, processes, and plans to support faculty in this period of rapid change.

Guiding coalition formation began in February 2020 with the formation of an academic continuity team consisting of administrators, faculty, and staff. The team was responsible for updating the continuity of operations plan (COOP) for the college and drafted plans for continuity of classroom, laboratory, and experiential instruction for a variety of contingencies, including a transition to online program delivery. Composition of the academic continuity team was modeled after the overall organizational structure of the college. This was a critical consideration to ensure that needs of all areas of the college were included when planning but also to facilitate buy-in from faculty and staff upon entering the implementation phase. The team was chaired by the administrator leading academic affairs initiatives for the college and included representatives from student services, experiential education, each of the college's three departments, one faculty member, and one staff member.

In order for these changes to be effectively implemented though, further faculty buy-in to the process was required. To achieve this, faculty leaders with online teaching experience or extensive experience utilizing educational technology were identified to serve as change agents during the transition. These faculty shared their expertise with their peers and provided resources and support as course modifications were planned and implemented. Teams of faculty teaching in similar areas also worked together during the transition; for example, a team of laboratory course coordinators collaborated to develop common methods for teaching lab content in the virtual environment. This peer-to-peer approach proved critical in developing college-wide buy-in to the transition plans and demonstrates the value of the bottom-up, team-oriented approach to creating change.

Creating the Vision – Step 3 of Kotter's Change Model

Developing and communicating a clear strategic vision is essential to successful change facilitation. Stakeholders in the process need to understand why change is required and how the organization will look different after the completion of the change process (Kotter & Cohen, 2002). Creating and articulating that vision in a scenario of crisis management produces unique challenges. By necessity, the specifics of the strategic vision needed to evolve as the situation changed so this step was revisited during the iterative implementation of Kotter's change model. This required the development of a short-term vision to guide the college through the immediate changes but also a longer-term approach to envisioning how changes made during the pandemic could guide opportunities in a post-pandemic educational environment.

While creating the strategic vision, keeping the overall mission and vision of the college at the center was critical. A key component of the mission is delivery of high-quality academic programs, and this mission needed to be carried forward into academic continuity planning. The planning team also recognized the need to examine both internal and external factors that would impact change when drafting the vision (Table 1). The 3P framework (Figure 2) summarizes these factors: People, Program, and Processes. The strategic vision should consider the needs of all stakeholders (people) affected by the change. In this case, the students were at the center of the vision as the goal of these changes was to provide a high-quality and safe learning environment for the students in our academic programs. However, in order to achieve this, the needs of all other stakeholders in the college required examination as well. Support structures and resources needed to be available to empower faculty to drive change. Staff support was also required to assist faculty and students during this process.

The program component of the 3P Framework includes consideration of unique program needs. Pharmacy, pharmaceutical sciences, medical laboratory science, public health, and respiratory care programs are included in the college. Most of these programs are offered entirely as traditional, on-campus programs; however, some were already completely or partially online (public health, respiratory care, and medical laboratory science upward mobility). The academic programs also have significant curriculum differences with varying time spent in laboratory, research, and experiential courses. For example, the pharmacy program utilizes face-to-face courses with lecture, discussion, and other active learning strategies. Skills-based laboratory courses are also included in the didactic curriculum. Experiential education activities at various practice sites including community pharmacies, hospital pharmacies, and clinics occur throughout the program, with the entire final year consisting of 8 – 5 week experiential rotations. Similarly, the on-campus medical laboratory science program features face-to-face courses and labs as well as experiential education. The pharmaceutical sciences graduate program includes extensive work in the research laboratory leading to the student's dissertation. Each academic program is unique, and therefore, the vision for change for each program had to be unique.

Finally, processes currently in place or that needed to be developed or modified were considered in vision development. Many of the academic programs in the college are accredited; therefore, it was critical to consider accreditation requirements and expectations in the vision for change. Broader expectations at the university and system levels also needed to be met. In this specific case, processes for online course delivery were already in place at the university including a standard learning management system and a review process for online courses. During the emergency period, it was important to recognize what modifications would need to be made in processes to make the required changes happen quickly. For example, the review process for online courses was waived due to the volume of courses needing to make the transition all at once. This also has implications for sustaining change after the pandemic when processes are reviewed and re-implemented.

As an example, the academic leadership of the Doctor of Pharmacy (PharmD) program decided to deliver all courses for the remainder of the spring 2020 semester in a synchronous online manner. This was in line with the vision to mimic the classroom experience as closely as possible in the virtual setting to ease the transition for the students and faculty. This approach also fit well with the unique features of the program and the structures and processes in place at the program, college, and university levels. Modifications to laboratory and experiential instruction were made to accommodate activities that could be done online (such as communication-based activities) versus what needed to be completed in person (including compounding and direct patient interactions). Content was rearranged in the schedule to move activities requiring in-person instruction and assessment to later semesters. Planning for the fall 2020 semester was completed over the summer, and the vision was adjusted to begin the transition back to campus. The blended synchronous learning model (Bower et al., 2015) was selected for the pharmacy program while hybrid instruction was chosen for medical laboratory science. These approaches were selected in order to achieve the vision of maintaining as much student-student and faculty-student interaction as possible.

Articulating the Vision – Step 4 of Kotter's Change Model

The strategic vision, along with resources to implement the vision, were communicated to faculty, staff, and students in multiple ways (Table 2). The 3C framework (Figure 3) guided this communication process – Communicate frequently and by multiple approaches; Connect to gain buy-in to the process; and Collaborate to remove barriers to change.

Multiple faculty/staff meetings and development sessions were held to convey information, gather stakeholder input, answer questions, and address any anxieties or barriers. The strategic vision was initially communicated at a college meeting in the spring. The COOP was presented along with the vision for spring semester course delivery. It was important to not only communicate the vision but also the underlying rationale and principles behind that vision. This deeper understanding of the strategic vision was critical to gaining buy-in from faculty, staff, and students. The college also wanted to share that vision with external stakeholders. For example, an article in the college's magazine shared information about the course delivery modifications made due to the pandemic. As the situation evolved, continued communication with all stakeholders was essential. Virtual meetings were held over the summer with faculty, staff, and students to continue communicating the vision and support our stakeholders in the transition. Areas for more targeted communication were also noted. For example, in the spring, communication to faculty and staff was conducted at the same time. However, it was later recognized that the needs of the staff were unique, and a separate session was conducted for staff over the summer. This change allowed for tailoring the discussion of the vision to the specific audience.

The key to successful communication of the vision was timely delivery of the message with all stakeholders multiple times using multiple channels. Email communication was used extensively to maintain regular contact and share timely updates. Regular email communication from university and college administration as well as the university's Center for the Enhancement of Teaching and Learning was sent throughout the spring and summer. However, relying on just one method of communication was not sufficient, especially during the initial stages of the change process. Meetings with faculty, staff, and students; virtual and in-person training sessions; and written documentation were all utilized to not only communicate the vision but also to facilitate change implementation (Table 2).

Empowering Faculty to Drive Change – Step 5 of Kotter's Change Model

Step 5 of Kotter's change model involves empowering others to achieve the vision and implementation of the needed changes with a short-term focus (Table 1). As described earlier, the 3P framework (Figure 2) was utilized to implement the change. Of the three P's, the people component is the central driving force for the change, while the process for the change was dictated by the program and other external influences. Top-down hierarchical structures can often be a source of disempowerment for bottom-up change, especially in the higher education setting (Akhtar & Kotter, 2019). While the formal organizational structure of the college was utilized to form the guiding coalition and the academic continuity plans, the informal faculty teams were empowered to develop strategies to drive large-scale change. To this end, the 3C framework (Figure 3) of communicate, connect, and collaborate was utilized to encourage teamwork among peers.

As noted by Kotter and Cohen (2002), empowerment is not about just giving new responsibilities and authority but rather removing barriers to change. Therefore, the goal was to identify and remove barriers to implementation of the faculty-driven changes. Barriers were identified at four different levels: program/system, technology, communication, and personal barriers.

Program/System Level Barriers

At the program level, the barriers were dictated by the instructional method, accreditation requirements, class size, and timely degree completion. A separate academic continuity plan was developed for each component of program delivery (didactic, laboratory, experiential education, and graduate dissertation work).

While the didactic portion of the curriculum can relatively easily lend itself to the online or hybrid format, laboratory courses are more challenging. For example, instruction and assessment of many skills taught in laboratory courses in the PharmD program require hands-on experiences, as guided by accreditation requirements. As a result, the laboratory activities were prioritized based on which activities could be completed virtually versus those that required hands-on experience. Some laboratory activities from spring 2020 were moved to the following semester because they required in-person attendance. For example, pharmacy skills laboratory instruction in sterile and non-sterile compounding was in progress when the switch to online courses was initiated. These labs require students to accurately prepare products, and the hands-on instructional and assessment components were moved to a subsequent semester. However, other aspects were adapted for online instruction. Discussion and quizzes were utilized to build and assess student knowledge in non-sterile compounding. Videos and images were created for instruction in aseptic technique and final verification of sterile products. Once on-campus courses resumed, the faculty worked together to create additional laboratory sections to comply with social distancing requirements and developed personal protective equipment (PPE) guidelines for lab activities. This also provided an opportunity for the faculty to identify opportunities to develop laboratory simulations and utilize other web-based simulations to enhance laboratory courses. For example, the medical laboratory science program purchased new technology to capture microscopy images that could be used in online laboratory experiences.

For experiential education, the guidelines of the health-system partners governed the timing and scheduling of student clinical experiences. To this end, the experiential program coordinator was empowered to work closely with preceptors to develop strategies to meet the minimum rotation requirements through virtual experiences, remote learning options, and alternative rotation schedules. Interprofessional education was also impacted by the pandemic. Traditional simulations were modified for the virtual environment to allow these experiences to continue.

In the PhD program, the pandemic posed a different set of challenges due to the initial campus shutdown and the later need to maintain appropriate social distancing in the research laboratories. The dissertation work of graduate students was halted due to the campus shutdown during the pandemic. The Department Head and the Associate Dean for Research worked with the individual faculty to identify essential laboratory functions and prioritized graduate students who were closer to completion. During the campus shutdown, graduate students worked virtually from home on data processing and manuscript writing guided by individual faculty. Graduate students also utilized this time to develop their professional skills through a weekly faculty interview series. When the campus reopened with social distancing guidelines, college administration worked with the student laboratory managers to develop and implement a plan to safely resume the dissertation work of graduate students. Due to travel restrictions, international graduate students were not able to start their program on time. The faculty offered synchronous and asynchronous online classes for the students who were not able to initially join the on-campus program. On the other hand, faculty faced challenges in training new graduate students in research techniques given the social distancing guidelines. However, faculty and senior graduate students used technology to record experiments for training new graduate students.

In addition to college-wide initiatives, individual departments and programs also created support structures to empower faculty to make changes to their courses. For example, the pharmaceutical sciences department held regular conversations about teaching approaches, challenges encountered, and solutions to address those challenges. These informal, regular conversations were valuable in encouraging faculty to take risks and in recognizing successes as well as identifying and addressing barriers. The conversion to online instruction happened in a matter of days, which would otherwise take years to complete.

Although this can be attributed to the sense of urgency created by the pandemic, this large-scale change was mainly accomplished through faculty themselves acting as change agents.

Technology Barriers

Given that the majority of faculty had never taught an online course prior to the pandemic, conversion of courses to online instruction posed a major challenge. To address this barrier, university and college-wide faculty development sessions on a variety of topics were presented. Again, the team-oriented, peer-to-peer approach was emphasized by having faculty leaders within the college present the sessions (Table 2). Topics for the early sessions included online exam delivery, remote proctoring technologies, use of video conferencing technology in course delivery, and ideas for including active learning in remote instruction. At the conclusion of the spring semester, faculty in the pharmacy and medical laboratory science programs had the opportunity to share approaches used in their courses, success stories, and lessons learned. This was not only a way to share innovative teaching approaches used within the college but also continued to build the guiding coalition of faculty leaders driving change. Further development of faculty champions came in a university initiative over summer 2020. The university's Center for the Enhancement of Teaching and Learning launched a course enhancement institute focused on backward course design and the taxonomy of significant learning (Fink, 2013). Seven faculty representing different academic programs in the college were nominated and participated in the summer institute. The primary objective of the institute was to guide faculty through redesigning a course with particular emphasis on incorporating alternative delivery approaches and educational technologies. Another objective though is that the institute once again added to our team of faculty champions driving change within the college. The faculty shared what they learned and the approaches planned for fall implementation in a series of summer faculty development sessions.

The college adopted a cohort model in fall 2020 for the pharmacy program in order to comply with social distancing guidelines. In this model, half of the class alternated between virtual and in-person instruction. A major challenge was student engagement in this hybrid teaching environment. For the first-year pharmacy students, classroom engagement was further complicated by the fact that the class did not have a chance to interact and familiarize themselves with their peers in-person. To this end, faculty discussions focused on online student engagement tools such as polling applications and discussion boards as well as strategies for intentional engagement of the two student cohorts in the courses.

In the early stages of the pandemic, there were some technology challenges due to lack of appropriate equipment such as laptops, webcams, and headsets for faculty. The college addressed this by purchasing new equipment for the faculty. Additionally, an unforeseen issue during the campus shutdown was home internet speed and at times internet outages. To address this issue, the faculty were given access to their office computers and were also provided with internet modems. Some of the students also faced issues with internet access and affordability. The faculty posted recorded lectures for students who were not able to join the live lecture. Although the intent of the recorded lectures was to assist students with technology issues or experiencing illness, it also provided an opportunity for faculty to review and self-reflect to improve their lectures.

While online exams provide flexibility in exam scheduling and grading, exam integrity was one of the major faculty concerns. Cheating in online exams was minimized through the use of remote proctoring technology, timed exams, and alternative assessment strategies. Based on faculty feedback, the college developed a netiquette policy for students including the use and sharing of recorded lectures.

Communication Barriers

As Kotter describes, information is a source of power, and the lack of it is disempowerment (Kotter & Cohen, 2002). To address this barrier, communication plays a very critical role in driving change (Table 2). One of the major challenges was the constant change and uncertainty associated with the pandemic. Leaders had to find a balance between timely and accurate communication. In addition, frequency and mode of communication are equally important. During the pandemic, the focus was on timely communication with an acknowledgment that the information may change in due course of time depending on factors beyond the control of the institution. The college used its existing communication avenues and developed additional avenues to communicate and collect feedback from stakeholders (Table 2). The flow of communication was both vertical (hierarchical) and horizontal (peer-to-peer interactions) using formal and informal processes. While top-down communication was utilized to share policy and guidelines, the peer-to-peer communication channels provided an opportunity to drive change by learning and sharing among faculty peers. To this end, virtual platforms were effectively utilized for communication among students, faculty, and administrators at various sites. More importantly, the virtual platforms also allowed a sense of community during the pandemic.

Personal Barriers

People have to be invested in the rational (head) and emotional (heart) reasons for change to happen (Kotter, 2012). While the pandemic made a strong rationale for changing to online instruction, overcoming the emotional barriers was required for faculty to fully embrace the change. Safety and health were the foremost considerations for implementing change during the pandemic. In addition, people had to quickly adapt to the change and balance their professional and personal lives. While the conversion to online instruction was done in a matter of days, it required extraordinary efforts from the faculty to accomplish this change. The additional effort and time required to convert the courses to online instruction were cited as a challenge by the faculty. The college addressed this issue by prioritizing faculty responsibilities and also taking this into consideration in the annual faculty evaluation. Furthermore, the university extended the tenure clock for faculty.

The risk of infection and sickness was another barrier in delivering courses during the pandemic. The College developed a contingency plan for teaching utilizing other faculty as well as alternative and block course schedules. Similarly, a contingency plan was developed for make-up laboratory sessions or alternative learning opportunities for student illness. The severity and uncertainty of the global pandemic had an impact on faculty and student stress (Darby, 2021). The College wellness task force immediately sprang into action to develop comprehensive wellness initiatives to support faculty, staff, administrators, and students and build a sense of community. Some of the virtual platforms were used to promote wellness, such as a virtual wellness wall and a virtual gratitude wall. Faculty safety concerns were taken into consideration in scheduling laboratory sections and implementing appropriate social distancing and protective measures. The weekly informal virtual faculty meetings also provided an opportunity to socially interact with their peers. In addition, the peer interactions provided faculty an opportunity to share different perspectives, reflect, and learn. Peer-to-peer sharing of the change experience was especially important in bolstering faculty self-confidence. Finally, the faculty champions played a big part in helping others to see the possibilities and to change behavior.

Generating Short-Term Wins – Step 6 of Kotter's Change Model

According to Kotter (Kotter & Cohen, 2002), short-term wins show progress, energize change agents, enlighten skeptics, and build momentum for change. The sense of urgency when the pandemic started in spring 2020 initiated the change to online instruction, but the lessons learned from those early experiences helped to identify faculty champions and also focus the change efforts on one or two meaningful areas to generate short-term wins (Table 1).

Faculty comfort with online exams increased as we moved from crisis management in the spring semester to strategic change management in the fall (Figure 1). Initially, there were some skeptics regarding the integrity of online exams. While some of the concerns are genuine, most of the concerns were due to the limited understanding of technology settings for online exams. By the end of the fall semester, the majority of the faculty moved from 'have to' to 'want to' use technology for exams. This change also included some powerful senior faculty who were generally resistant to the use of technology but discovered the value of using online exams due to convenience and ease of grading. Again, this demonstrates the impact of addressing the 'heart' (emotional) aspect of the change (Kotter & Cohen, 2002). Skills-based assessment methods also required adaptation to the online learning environment. As an example, pharmacy students' ability to interview a patient to determine appropriateness of self-care and to counsel on an over-the-counter medication was assessed using video. The lessons learned from this short-term win were applied in a face-to-face skills examination in spring 2021; the use of video in this skills examination decreased the number of faculty required for exam administration.

Another short-term win is the increased use of classroom technology and applications to engage students. Although efforts to increase the use of active learning methods in the curriculum were already underway, the pandemic helped to bolster these efforts in more widespread use of active engagement tools out of necessity in the hybrid teaching model. An example of how faculty adapted their teaching strategies to the new environment involves technology-enhanced discussion. Small and large group discussion were common active learning strategies utilized in the pharmacy program prior to the pandemic. Discussion became more challenging in the online and hybrid environments. Breakout rooms were used to facilitate small group discussion; however, monitoring the rooms to keep discussion on track and answer student questions proved challenging. Faculty adapted to these challenges by utilizing educational technology to enhance the discussion. For example, students could post questions or responses to the discussion on the learning management system discussion board, a shared document, or an online bulletin board tool. Additional examples of tools used to enhance virtual interactions as well as challenges and potential solutions are provided in Table 3.

These short-term wins were accomplished by identifying, developing, and recognizing faculty champions who were the early adopters. At the beginning of the pandemic, the faculty champions served as support for peers in setting up an online course in the learning management system. These faculty champions were further developed utilizing the summer teaching institute in course design for alternative delivery models. These faculty champions then shared their experience with other faculty. Their efforts were recognized in faculty meetings and annual performance reviews. Again, the peer-to-peer interaction during the weekly informal faculty meetings provided an opportunity for faculty to share their wins and bring more people into the fold. As Kotter notes, the more visible victories are the more they help the change process, and valued achievements connect people at a deeper level to change behavior (Kotter & Cohen, 2002).

Looking to the Future – Steps 7 and 8 of Kotter's Change Model

The final steps of the change framework involve building momentum and sustaining change moving forward. The short-term wins create momentum and direction for the change. At this stage, declining urgency can make it challenging to sustain change. Even if the urgency remains high, sustaining change can be challenging due to exhaustion (Kotter & Cohen, 2002). This is especially true with the COVID-19 pandemic which has been ongoing for over a year. The additional work, effort, and time required to make changes to courses can overwhelm faculty (Darby, 2021). To this end, the college focused on utilizing a stepwise approach by building on the early wins to make short-term and long-term changes (Figure 1). For example, as the faculty became more comfortable with online instruction, the college started faculty discussions around classroom engagement tools with a weekly focus on a specific topic.

Prior to the COVID-19 pandemic, the college had formal faculty development sessions, but informal conversations about teaching did not happen on a regular basis. Formal faculty development sessions are important, but the peer-to-peer informal conversations and sharing of ideas that occurred during the pandemic were very valuable for faculty. These conversations demonstrated to faculty that their peers were also taking risks and trying new teaching approaches and that if challenges were encountered there is a team of faculty ready to discuss potential solutions. Such informal conversations among faculty catalyzed the changes in faculty mindset for risk-taking, which was not only critical for the rapid adaptive changes in the early stages of the pandemic but also for sustaining those changes. Furthermore, the bottom-up team approach allowed faculty to break out of disciplinary silos and promote collaboration among the faculty.

An off-shoot of the peer-to-peer interactions during the pandemic led to the creation of new interdisciplinary/interdepartmental research initiatives. For instance, the pharmaceutical sciences department initiated a 3D-framework (Disease, Drug, and Delivery) to integrate and advance team-science within the department. Similarly, efforts are underway to integrate the 3D-framework with the 3P framework (Patient, Provider, and Payer) and the practice and social/administrative science faculty to promote interdisciplinary and interdepartmental translational research. Taken together, the informal faculty team approach and peer interactions are critical to sustaining change.

A strong and supportive culture is paramount to sustain and institutionalize change. The culture of an institution includes a set of behavioral norms and shared values (Kotter & Cohen, 2002). A change in culture occurs only when the new way of operating has been shown to succeed and is recognized (Akhtar & Kotter, 2019). The creation of new norms also means changing deeply embedded norms.

SOLUTIONS AND RECOMMENDATIONS

The next step for higher education leaders is consideration of how the changes made and lessons learned during the pandemic can be used to reshape higher education in a post-pandemic world. The following section summarizes the lessons learned and implications for the future based on the use of Kotter's framework to drive change in pharmacy and allied health professions education during the pandemic. Kotter's change model is typically viewed as a linear process. However, the constantly evolving nature of the pandemic required an iterative process. The situation also necessitated accelerated implementation. The iterative, rapid implementation was different to how the change model would normally be implemented; however, Kotter's framework was successfully utilized even in a period of uncertainty, demonstrating that the model can be used in this manner as well. Assessment of the impact is also important to guide future developments. Through a survey and teaching conversations, opportunities to sustain change and incorporate it into the culture of the college have been discovered. Challenges have also been identified, and strategies to overcome these barriers will guide further improvement initiatives.

It goes without saying that persistence and patience are important in harnessing the power of culture in making large-scale changes. To this end, the bottom-up approach is more sustainable, where people buy-in and persist through challenges since they want to be part of the change as opposed to the top-down approach of 'have to' change. Communication and continuous engagement are critical throughout this process (Figure 3). As described earlier, a team-oriented approach with faculty leadership and extensive communication was key in the successful implementation of the online, hybrid, and blended teaching approaches (Table 2). This is a critical lesson learned in the implementation of any change in health professions education. A change strategy can be well developed, but without an effective communication plan and/or buy-in from the stakeholders, the desired change will be difficult to sustain.

Lack of faculty familiarity with alternative learning approaches and educational technologies is often a barrier in the development or expansion of distance learning. The pandemic forced the utilization of these approaches and technologies, even for faculty and programs who had never considered these delivery methods. The short-term wins in utilization of alternative delivery modes during the pandemic can build momentum for the development of new programs or pathways utilizing online or hybrid delivery. As an example, the pharmaceutical sciences department is currently developing an online master's degree. The experiences with online course delivery because of the COVID-19 pandemic helped faculty envision program delivery options that offer flexibility for students and built faculty buy-in for development of an online program pathway. The virtual platforms provide expanded opportunities which are not otherwise possible (Table 3). For example, the conversion of the department seminar series to a virtual format provides opportunities to have speakers from all over the world without the need for travel or added cost. Simultaneously, the College has also started to take steps to upgrade technology for sustaining the changes made during the pandemic.

Student engagement is a challenge in online, hybrid, and blended learning environments. This challenge brought renewed focus to the importance of student engagement and strategies to increase active learning. Faculty survey data indicated that the faculty are interested in continuing use of educational technology beyond the pandemic, including online exams and quizzes, virtual office hours, and technologies to enhance student engagement. Continued faculty development to support course modifications that encourage active learning in all learning environments should be a future focus. This includes expanded use of educational technology in face-to-face course delivery (Table 3).

Empowering faculty to be agents of change was critical in driving the change process forward, but it is also necessary to sustain change and shift culture. This empowerment comes from removal of barriers and support for the faculty. Traditionally, faculty support has come from faculty development sessions or workshops and formal mentoring programs. However, faculty survey results indicated that informal discussions with other faculty and self-instruction were actually the most helpful when moving their courses to online or hybrid instruction. While the formal mechanisms of faculty support are certainly important, recognition of the impact of informal conversations and providing resources for self-improvement is important. One of the post-pandemic goals is to find ways to continue opportunities for these discussions and sharing of resources. Potentially expanding to interdepartmental conversations on teaching would be another approach to sustaining the environment of collaboration post-pandemic.

As Kotter notes, change held in place solely by a guiding team, a central player in a team, or an organizational structure does not lead to a sustainable shift in the culture (Kotter & Cohen, 2002). To this end, our approach of developing a guiding coalition of faculty was important in generating momentum for change and developing the support structures needed to sustain that change. It is important to recognize the people who embrace change, which leads to the culture development needed to sustain large-scale change. For example, the faculty change agents were recognized in their annual review and in faculty meetings. The college excellence awards program is another avenue for recognizing faculty leading the change with creative approaches for the online/hybrid instruction. Finally, it is important to maintain the continuity of behavior and results that help the new culture grow.

FUTURE RESEARCH DIRECTIONS

As health professions education transitions to the post-pandemic educational environment, continued research on the impact of experiences during the pandemic on instructional approaches and student learning is necessary. To this end, the "plan, do, study, act" model often used in health care quality improvement (Langley et al., 2009) is useful for reshaping pharmacy and allied health professions education. Kotter's framework sets programs up for success in changing culture and sustaining change. Further investigation needs to be done though to evaluate the effectiveness and student and faculty perceptions of the new educational models and approaches being utilized. The pandemic also caused changes in health care delivery models. Given the pandemic-induced changes in healthcare education and practice, continuous evaluation and quality improvement processes will be critical to sustain the changes. For example, health professions curricula should be evaluated for content and assessment of student learning in digital health technologies, including telehealth (FIP, 2021). Research on optimal methods for telehealth instruction and the impact of expanded digital health technology use in practice will be needed to inform change.

CONCLUSION

Kotter's 8-step model emphasizes the importance of shifting people's behavior in large-scale transformational change. The key to changing behavior is more about people seeing and feeling the change rather than analysis and thinking. The rational (head) and emotional (heart) aspects of change have to be considered in all 8-stages of Kotter's model. It is also important to note that the 8-steps are not necessarily linear but can be implemented as an iterative process. We operationalized Kotter's model by using the 3P and 3C frameworks to drive change in pharmacy and allied health education during the COVID-19 pandemic. More importantly, our approach demonstrates the power of culture change from the bottom-up using faculty teams and informal peer interactions to drive change. The lessons learned during this pandemic will help reshape pharmacy and allied health education in a post-pandemic environment. Although digital health has been an ongoing effort, the pandemic has further underscored the importance of expediting the widespread adoption of digital health technologies. It is imperative that future pharmacists and healthcare professionals are trained and are competent to practice in the digital environment. Faculty development to support curricular changes for training students to be competent to practice in the digital environment should be a future focus. There is no doubt that the COVID-19 pandemic has challenged health care education in many ways, but the lessons learned during the pandemic will make the programs stronger and more resilient to innovate and prepare for a better future.

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KEY TERMS AND DEFINITIONS

Asynchronous: Course delivery method where content is not delivered to all students at the same time; allows student flexibility in access to content.

Blended Synchronous Learning: Educational method that utilizes a blend of in-person and online activities, where the online cohort learns synchronously with the in-person cohort.

Educational Technology: Any technology used to deliver or supplement educational content, enhance student engagement in learning, and/or promote self-directed learning.

Faculty Development: Activities implemented to enhance the teaching knowledge and skills of course instructors.

Hybrid Education: Educational method that utilizes a blend of in-person and online activities.

Online Education: Educational method that utilizes the internet to deliver content; delivery can be asynchronous or synchronous.

Synchronous: Course delivery method where content is delivered to all students at the same time.

APPENDIX 1: FIGURES

Figure 1. Application of Kotter's model to implement changes during the pandemic and beyond

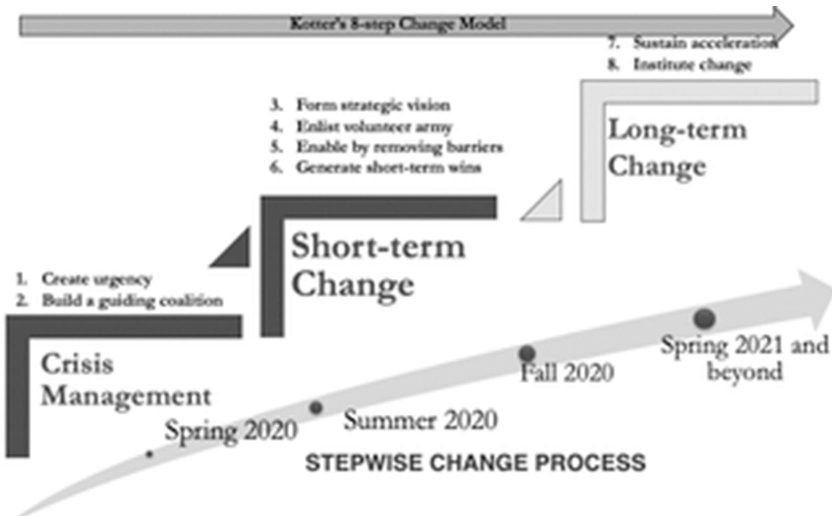
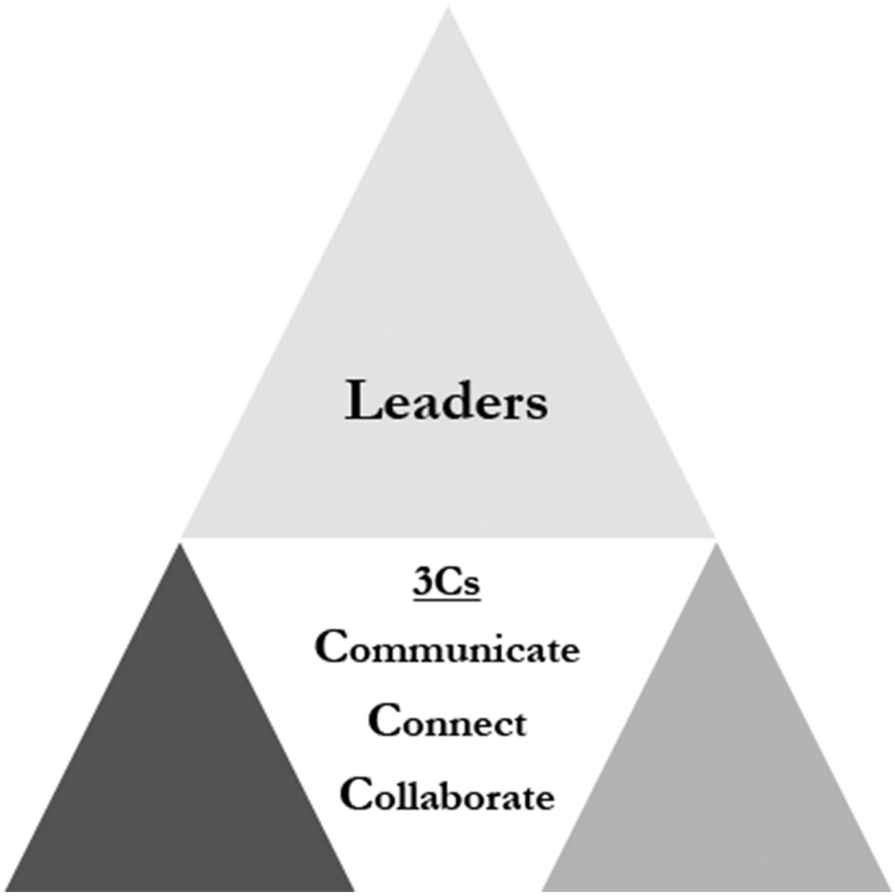


Figure 2. The 3P framework of integrating people, programs and process for implanting change

Figure 3. The 3C framework of communicate, connect and collaborate for enabling change



APPENDIX 2: TABLES

Table 1.Application of Kotter's 8-step model to lead change during the Covid-19 pandemic

Kotter's 8-steps	Description	Strategies
Step 1: Establish a sense of urgency	● COVID-19 pandemic ● Crisis management ● Continuity of operations amid campus shutdown	● Convert to online instruction ● Prioritize essential functions (on-campus vs remote work) ● Ad hoc committee to update COOP for each area. ● Prioritize faculty development needs for managing the crisis in the short term ● Plan for contingencies
Step 2: Create a guiding coalition	● Involve stakeholders ● Faculty peer support groups	● Leadership to spearhead efforts in each of the areas ● Form faculty teams to support online conversion
Step 3: Form a strategic vision	● Establish a framework to manage the short-term crisis with an eye towards long-term change	● Utilize the 3P framework to align People, Programs and Processes to guide change ● Management (maintenance and consistency) and Leadership (establishing direction and moving towards the future) ● Develop a nimble plan, acknowledging that the plan will evolve ● Articulate the 'big opportunity' and 'why' for the change ● Appeal to the 'head' (rational) and 'heart' (emotional) aspects of change
Step 4: Enlist a volunteer army	● Communicate the vision ● Broader buy-in for large scale change	● Utilize 3C framework to Communicate, Connect and Collaborate to guide change ● Communicate frequently and regularly with a balance between speed and accuracy ● Utilize multiple modes of communication, including formal and informal approaches ● Maintain transparency in communication; acknowledge what is known and not known ● Invite diverse perspectives
Step 5: Enable action by removing barriers	● Identify barriers to implementing change ● Encourage experimentation and risk taking	● Identify the system/program, technology, communication, and personal barriers ● Seek feedback from faculty and students ● Technology upgrades, including microphones, webcams, and laptops ● Provide alternative/flexible options, e.g., remote or in-class online exams, faculty/staff work-schedules, and makeup sessions for students ● Implement wellness initiatives and other support for faculty, staff and students, e.g., faculty peer support teams, virtual help sessions for faculty and students
Step 6: Generate short-term wins	● Recognize/reward change champions ● Move from 'have to' to 'want to' using bottom-up change	● Identify/recognize faculty champions, share faculty success in formal and informal faculty meetings ● Recognize faculty efforts in annual review ● Develop faculty champions, e.g., summer teaching institute for faculty champions ● Prioritize low-hanging fruit for faculty buy-in, e.g., online exams ● Use data to support the change, e.g., sharing student feedback with faculty
Step 7: Sustain change	● Build on early wins ● Continue to build on the opportunity ● Move from 'reactive' to 'proactive' mode	● Share best practices and lessons learned with faculty ● Technology upgrades to support the change ● Build on the success to expand other programs, e.g., online/hybrid flexible course development for graduate program
Step 8: Institutionalize the change	● Embed the change in the institutional culture ● Institute new ways of working to realize the opportunity	● Identify what changes will be sustained beyond the pandemic ● Identify opportunities to utilize virtual platforms, e.g., zoom classes for faculty teaching from other sites, opportunities for faculty collaboration from different sites, virtual office hours ● Explore new programing opportunities, e.g., hybrid/flexible academic programs, online graduate certificates

COOP- Continuity of operations plan; Ref Sources: https://www.kotterinc.com/research-and-perspectives/transformation-in-education/; Weiss, P.G., et al., Acad. Pediatrics, 20, 735-741, 2020.

Table 2. Communication strategies for leading change

Stakeholder	Strategies
Administrator-Administrator	• Weekly College Executive Team meetings to develop plans, share ideas/feedback, and wellness tips • Weekly individual meetings with Dean to discuss program specific issues • University management meeting (twice a semester) to share policy changes and updates • Friday Leadership Coffee session with University HR for policy changes and updates • Email as needed
Administrator-Faculty	• Monthly college faculty meetings • Department faculty meetings (twice a semester) • College faculty development sessions • Weekly department faculty check-in meetings • Dean's Friday email message • Monthly "Dine with the Dean" meetings • Email from leadership as needed • One on one meetings (once a semester and as needed)
Faculty-Faculty	• College faculty development sessions • Weekly department faculty check-in meetings • Peer online teaching support groups • Monthly "Dine with the Dean" meetings • One on one peer meetings/emails
Administrator-Student	• Professional hours with Associate Dean for Student Services • Individual and group meetings with college and program administrators • Email from leadership as needed • Dean's Student Council meetings
Faculty-Student	• Classroom interactions and communications • Learning management system • Virtual office hours • College/Department seminars/convocations
Student-Student	• Classroom interactions/communications with peers • Virtual orientation • Supplemental instruction sessions • Student organization meetings

Table 3. Opportunities for virtual interactions and engagement to help institutionalize change

Virtual interactions	Opportunities	Challenges	Solutions
Online exams	• Flexibility for students and faculty • Ease of grading and quick turnaround time • Less travel	• Balancing question format that is manual vs autograded • Utilizing tools to ensure exam integrity • Limited opportunity for students to ask questions during the exam	• Faculty development on exam writing • Utilize remote proctoring technology • Explore alternative methods of assessment
Electronic textbooks and course notes	• Flexibility for students and faculty • Ease of updating the course material • Ease of access • Online links to additional resources	• Being mindful of copyrighted material • Restricting access to the class • Concerns regarding open sharing of the course material • Ensuring compliance with accessibility of course content	• Faculty development on copyright • Restrict access/downloads of course materials • Provide faculty with tools to check document accessibility
Open educational resources (OER)	• Expanded learning resources • Incorporation of educational videos and content • Fostering independent learning outside of the classroom	• Identifying course specific OER • Ensuring that the OER links are updated • Effective use of OER to enhance student engagement	• Collaborate with librarians to identify OER resources

continues on following page

Table 3. Continued

Virtual interactions	Opportunities	Challenges	Solutions
Online polling tools	• Student engagement in the classroom • Class review • Peer and faculty feedback • Adjust/clarify concepts or change teaching strategy	• Strategic use of online polls for classroom engagement • Utilizing applications that allow easy integration into the lecture	• Share best practices with faculty • Maintain list of online polling tools to share with faculty
Online discussion boards/bulletin boards	• Student engagement in the classroom • Case studies • Peer and faculty feedback • Supplemental teaching material • Available for later review by students for exams	• Strategic and intentional use of discussion boards with a clear purpose • Choosing appropriate virtual platforms to ensure peer interactions	• Faculty development • Assess impact on student learning and peer interaction
Recorded lectures	• Asynchronous learning and engagement opportunities • Review of lectures • Opportunities for faculty to self-reflect and make changes to their teaching style • Flexible option in case of student/faculty illness or technologies issues	• Concerns regarding sharing of the lectures outside of the class • Ensuring copyrighted material is appropriately referenced	• Restrict video access and downloading options • Faculty development on copyright issues
Virtual office hours	• Student support and assistance outside the classroom • Review exams • Provides flexibility for faculty and students	• Alignment of virtual office hours with student class schedule • Balance between in-person and virtual office hours	• Ensure all faculty have easy access to full course schedule • Maintain master schedule of office hours times
Virtual faculty meetings	• Flexibility in scheduling meeting with off-campus faculty • Opportunities for cross-disciplinary interactions with faculty at different sites • Reduced travel and cost	• Avoid overuse to prevent virtual meeting fatigue	• Balance between virtual and in-person meetings as appropriate
Virtual seminars	• Expanded opportunities to have speakers from all locations • Option of watching the recorded presentation • Reduced travel and cost • Opportunities for outreach to community and other stakeholders	• Ensuring netiquette • Concerns regarding sharing of recorded lectures • Concerns regarding sharing the meeting link with outside participants	• Provide netiquette guidelines • Restrict video access and downloading options
Virtual dissertation defense	• Flexibility in scheduling • Broader participation in public defense presentation	• Ensuring netiquette • Concerns regarding sharing of recorded presentation	• Provide netiquette guidelines • Restrict video access and downloading options

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Chapter 6
Course Model Redesign for Continuity of Instruction

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ABSTRACT

The purpose of the chapter is to illustrate instructional models that were implemented by Samford University McWhorter School of Pharmacy to comply with COVID-19 social distancing restrictions. While the second half of Spring 2020 was completely online (statewide shutdown), the university remained open in a hybrid manner for the 2020-21 academic year. There are three sections in the chapter: didactic, interprofessional, and advanced pharmacy practice experiences. The didactic section discusses course delivery methods and active learning, office hours, remote testing, student feedback, and contingency planning. The interprofessional section illustrates some of the school's synchronous and asynchronous interprofessional learning activities before and during the COVID-pandemic, as well as interprofessional education assessment methods. The last section of the chapter discusses how advanced pharmacy practice experience "direct patient care" was redefined, examples of the experiences, and contingency plans that were put into place to ensure on-time graduation for the classes of 2020 and 2021 pharmacy students.

INTRODUCTION

COVID-19 has brought an abundance of change to all levels of education over the past year. In an effort to mitigate the spread of the disease and keep students and employees safe, remote learning and education became the norm for a minimum of six months (Draugalis, et al., 2020; Kawaguchi-Suzuki, et al.,

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2020; Romanelli, et al., 2020). While all higher education institutions faced similar challenges, they had slightly different variations in responses. The purpose of this chapter is to explain course models and strategies that were adopted or developed by the Samford University McWhorter School of Pharmacy to accommodate COVID-19 social distancing restrictions. The chapter objectives are as follows: (1) to describe methods for hybrid delivery of didactic and laboratory courses; (2) to describe methods for hybrid interprofessional activities; and (3) to describe methods for hybrid advanced pharmacy practice experiences.

BACKGROUND

Samford is in a suburban location of Birmingham, Alabama and has approximately 7,000 students and employees. The McWhorter School of Pharmacy has approximately 40 faculty members and 115 students per professional year cohort. Its Doctor of Pharmacy (PharmD) program is accredited by the Accreditation Council for Pharmacy Education (ACPE) as a four-year in-person professional program.

Samford University ceased normal spring semester operations abruptly in March 2020. Faculty were asked to adjust as quickly as possible to move content to and teach their courses entirely online through the university's learning management system (LMS), Canvas (Instructure, 2021). Instructional designers and information technology staff held numerous online help sessions to assist faculty with this transition. Fortunately, the McWhorter School of Pharmacy already had all its classes and syllabi in Canvas, as well as most of its supplemental course materials. The traditional in-person component is what needed to be 'figured out' in a very short time frame. The spring semester finished as scheduled (although not in the manner it was scheduled), noting lessons learned along the way.

The university stated that its "response to the COVID-19 pandemic is focused on mitigating the risks for contracting and transmitting the virus among employees, students and others while continuing to be a place of superior learning and personal development" (Samford University, 2021). With strict precautions such as COVID testing prior to the fall and spring semesters, random COVID testing for students and employees, increased physical spacing in classrooms and open areas, and augmented cleaning protocols, the university was able to open (with pre-planned remote instruction from Thanksgiving to the end of the fall semester) for the entire 2020-2021 academic year. Having an in-person component was important to the university and school. Changes to course models, however, were necessary across campus to accommodate the six-foot social distancing rule.

COURSE MODEL REDESIGN

Issues, Controversies, Problems

Samford University McWhorter School of Pharmacy, like all educational institutions and programs, faced the challenge of managing the logistics and safety protocols for teaching and assessing content traditionally delivered in classroom, laboratory, and experiential settings. Of equal importance to managing the logistics required for social distancing, the school had to safeguard the achievement of student learning outcomes and compliance with applicable regional and professional accreditation standards. The authors will discuss modifications to the school's didactic and laboratory courses, interprofessional activities, and advanced pharmacy practice experiences (APPEs).

DIDACTIC AND LABORATORY COURSES

Hybrid Delivery with Active Learning

The spring semester of 2020 included a change from in-person instruction to mandated remote instruction. As employees gathered their belongings to shelter at home, no one was certain if remote instruction would be for a few weeks or for much longer. Schools that were well-versed in online education theoretically had a smoother transition than schools that were primarily classroom-based. For the remainder of Spring 2020, most pharmacy schools focused on how to complete experiential requirements for the Class of 2020, with online didactic teaching being done in the best manner possible under the circumstances.

Fortunately, programs had time over the summer to plan for an abnormal 2020-21 academic year. Samford University determined that it would use a hybrid model, combining in-person education with online education through the university's Canvas LMS. At the McWhorter School of Pharmacy, much consideration was put into the number of hours online versus on-campus [to comply with the Southern Association (SACSCOC) regional accreditation standards], and which courses would be hybrid, all on-campus, or all online.

Ultimately, there were a few fully-online courses per professional year, such as a first-year drug information course which was already online, and a third-year research course which students had recommended be online. In-person courses were limited to one or two low-credit (and hence low exposure time) courses that would benefit in having face-to-face interactions. After deciding which courses were online and which courses were in person, what remained were the higher-credit Department of Pharmaceutical, Social, and Administrative Science and Department of Pharmacy Practice courses worth 3-4 credits each, as well as laboratory courses that were normally several hours per week. The faculty agreed on a new hybrid delivery strategy for these courses.

Prior to the pandemic, students attended on-campus classes four or five days per week, and all classes except electives and laboratories were held in one of two large lecture halls. For the hybrid semesters, the administration divided the students in the first, second, and third professional years into three groups per professional year. Depending on the group, students attended on-campus classes one or two days a week, with different days assigned to each group. For example, in the fall, first-year students in Group 1 attended on-campus classes on Monday and Thursday, Group 2 attended on Tuesday and Wednesday, and Group 3 attended on Wednesday and Friday (see Table 1). The large lecture halls accommodated the required social distancing. Schedules were adjusted slightly in Spring 2021, based on student feedback. A small

Table 1. Pharmacy student on-campus attendance in fall 2020

Group	M	T	W	R	F
1	x			x	
2		x	x		
3			x		x

number of students were given permission to participate remotely all year using Echo360, a live online videoconferencing platform, due to a high-risk health condition or other university-approved reason.

Social distancing in the classrooms was ensured by numbering the tables in front of the seats that were allowed to be used. Every other row remained empty and two seats between each student remained empty. At the beginning of fall and spring, students chose their seat and submitted that seat number via an online survey to administration. Each student was required to use that seat for the remainder of the semester. Note that each professional year is assigned to only one of the large lecture halls, so the same seat could be used for all on-campus courses. Study, dining, and conversation spaces throughout campus were also reconfigured and labeled for proper social distancing.

The pharmacy school decided to make the on-campus portion of courses entirely active learning; gone were the days of traditional lectures. Some courses had previously integrated more contemporary teaching strategies, but now all courses had to adapt. To participate fully and competently in the active learning activities, students were required to do all reading, video-watching, and preparation before arriving to class. Most faculty divided content into chunks and recorded videos of themselves teaching the material. Others uploaded publicly-available videos related to the content, and of course, faculty referred to content in the [already] online textbooks that covered the material.

The active learning sessions were designed to help reinforce material the students had covered asynchronously. This instructional strategy was new to most Samford-McWhorter students, as they were accustomed to having homework after a course session, but not necessarily prior to a course session, and they had not previously been asked to do as many in-class activities. Before the hybrid teaching model, courses included snippets of active learning, but rarely was an entire course session devoted to active learning (aside from laboratories). The hybrid method which was developed raised the bar for most students. While it had always been emphasized that keeping up with reading and studying outside of class was necessary, it had not been a point of public/peer awareness. In other words, now if a student did not prepare for class, the lack of preparation was obvious to the professor and to classmates in small group activities. (As an aside, small group activities were completed using a variety of online tools in order to accommodate social distancing requirements).

One pharmacy course was found to have too much online content, but many difficulties that occurred with the hybrid model were related to time management by students. Students were either trying to (or needing to) juggle numerous outside responsibilities, or students were struggling with setting aside appropriate time for coursework. Outside responsibilities included employment, which became quite a problem as employers asked for more assistance due to COVID-19, and/or taking care of older adult parents and/or children in the family. With most public schools essentially shutting down, parents of young children became full-time home-school teachers in spring 2020, and part-time home-school teachers for the 2020-21 academic year.

Laboratory Courses

In Spring 2020, non-essential laboratory (lab) activities were cancelled, and essential lab activities were postponed until early Fall 2020. Over the summer, the fall lab schedules were carefully planned to include makeup activities and frontload any activities that needed to be completed in person. The latter half of the fall semester had lab sessions that were delivered online – some synchronously and some asynchronously. The frontloading of live labs was in the event that the COVID situation worsened, and the university moved to all online instruction partway through the semester, as was done in Spring

2020. Fortunately, that did not happen. Spring 2021 labs were carried out similarly – some live, some synchronous online, and some asynchronous online. Cohorts continued to be divided into small groups that could meet social distancing requirements in the lab facilities.

Office Hours

Office hours are a standard component of faculty responsibilities. Some programs have specific requirements for the number of hours per week faculty are to be available for 'office hours', while other programs may be more flexible. Office hours are not unique as a complement to didactic courses at the McWhorter School of Pharmacy. Faculty have the purview to schedule them as appropriate. What is unique, however, is the way some faculty reappropriated this time to make it course-specific. Several methods were used across courses:

- Method 1: Students scheduled appointments on an as needed basis, negotiating the timeslot based on the faculty member's potentially varying schedule.
- Method 2: Faculty members held traditional office hours, but due to COVID-19 social distancing requirements and space limitations in some faculty offices, the office hours were primarily held online/synchronous.
- Method 3: Faculty members held online group office hours that were synchronous but recorded, discussing questions and answers on the students' 'muddiest points' in the course. The professor would collect these questions prior to the session so that he/she could better prepare to assist students. The professor also did not call these time slots 'office hours': they were called 'review sessions'.

Students indicated that they generally did not prefer method 1; they liked to know when faculty would be available. Faculty were disappointed with method 2, as few students typically participated in these timeslots. Method 3, in contrast, was preferred and well-attended by students. Students liked the additional opportunity to ask questions about the material they had been studying and having the responses recorded for classmates who were not able to attend. Quiet students liked the benefit of seeing/hearing a professor's response to questions asked by classmates. Because days can be quite full, students also liked to have sessions in the evening when possible. This was not feasible for all faculty members, but based on feedback during student townhalls, it was preferred by students, nevertheless.

There were advantages and disadvantages of each method. Method 1, by-appointment office hours, worked well for administrative faculty members who had numerous meetings to attend and found it difficult to block calendar time that may be unused by students. These faculty still had time available for student meetings, but it was simply not consistent from week to week. The disadvantage was that some students preferred to know absolute availability, even if they do not take advantage of the office hours. Method 2, traditional office hours (online), worked well for students who wanted to plan their weeks and know when a faculty member would be available to meet, if needed. The disadvantage was that the timeslots may be taken by classmates. Method 3, recorded group online review sessions, worked well for students who were unable to attend or who were hesitant to ask questions. A potential disadvantage was that students sometimes preferred to have those sessions in the evening, which was not possible or practical for many faculty.

Remote Testing

Testing became a challenge for many schools, colleges, and universities in Spring 2020 when stay-at-home orders were given by their university or geographic location (Kawaguchi-Suzuki, Nagai, et al., 2020). Fortunately, the McWhorter School of Pharmacy was already using ExamSoft, an online testing application. Unfortunately, it had not subscribed to the ExamMonitor add-on at the time, which provides remote proctoring features for exams. This resulted in several changes to the testing protocol for students. First, the remainder of spring exams were designated as open book (but still had a time limit). Second, which always applies, but was even more essential, was the honor code and code of professionalism. No test information was to be shared. Third, to assist with students who now had children at home due to school and daycare closures, exams could be taken between 5am and 11pm on the assigned day. This allowed students (especially parents) to take their exams at a time that would hopefully have the least interruption. Passwords/codes for the tests were emailed prior to the test. Faculty were concerned about exam integrity, but students appreciated the flexibility of when to take an exam.

As mentioned earlier in this chapter, Samford-McWhorter pharmacy courses were offered in a hybrid manner in Fall 2020 and Spring 2021. Due to the large number of students in each cohort, the school continued to have remote testing in order to comply with social distancing requirements. However, to assist with exam security and item integrity, the school added ExamMonitor to its ExamSoft contract. With ExamMonitor, students are videotaped (using their laptop's camera) during the exam, and keystrokes are recorded. Videos are flagged afterward by artificial intelligence, flags are reviewed by ExamMonitor proctors, who categorize the significance of the flags, and then PharmD program employees review the significant flags. The other difference for 2020-21 was the return to pre-COVID method that all students took exams at the same time of day. Days and time were chosen in relation to other [field] classes and to allow reasonable commuting time to/from campus. To eliminate the high cost of online proctoring, provide a stable/quiet testing environment, and because the university is set to return to "normal" operations in Fall 2021, on-campus testing at the pharmacy school will resume in the fall.

Non-course-related assessments also saw a change for Spring 2020 and the 2020-21 academic year. The Pre-NAPLEX, traditionally given in April/May and December, was allowed to be taken at home. It is a no-stakes assessment, so no proctoring was required. Professional development self-assessments were also taken at home. The Pharmacy Competency Outcomes Examination (PCOA)—normally required by ACPE during the last year of didactic courses—was designated as optional for the 2020-21 academic year. For schools that chose to continue it, students took the exam at home and were proctored remotely by an external proctoring company. Most significantly, the post-graduation national licensure exam was stopped for a few months in late spring/early summer of 2020, but it was restarted slowly in late summer 2020 with limited testing spots available at testing centers. On-site testing has expanded in 2021 as COVID vaccinations began and mask mandates are being dropped.

Student and Faculty Feedback

A critical stakeholder in the transition to online or hybrid learning was the students themselves. The school held several online townhalls in fall and spring to gather feedback from students. Students communicated any issues related to the online or in-person delivery of specific classes, testing times/dates, and other issues on their minds. Some expressed thanks for the school's hybrid model and trying to accommodate student requests. In January 2021, the university decided to cancel spring break and end the semester one week early. This schedule change had some unexpected consequences, such as compression of exam dates, which students were quick to point out.

Although course evaluations were not conducted in Spring 2020, they were reinstituted in Fall 2020 to ensure faculty were receiving feedback that could be used to make appropriate adjustments. Ratings and comments are reviewed carefully after each semester by designated administrators, course coordinators, and instructors. Aggregate results are also compiled and shared across the school so faculty can see how their course or instruction compares to others.

A comprehensive student annual survey was conducted in February 2021 to collect perspectives on academic affairs, student affairs, and other program-related components. This information is used each year to adjust where possible or to explain to students why things are done the way they are done or to explain why things cannot be changed. In light of all the changes since early spring 2020, the 2021 survey indicated remarkably good outcomes. Questions are worded positively, and the average response for most questions was between “Agree” and “Strongly Agree”. One area which needed improvement, which is an area for improvement each year, was related to student stress. The average score was ‘high’ and was attributed to pressure of obtaining or maintaining high grades, the volume of exams and assignments, and trying to balance school and employment.

Likewise, a faculty/staff annual survey was conducted in March 2021, and it too had good outcomes considering university and school continuity of instruction changes to avoid spreading COVID-19. As with the students’ survey outcomes, stress was the lowest scoring topic for faculty. Key factors for faculty were overall workload, time for scholarship, and number of meetings. Stress results were very similar to those in Spring 2020, and in fact, stress scores for staff and science department faculty improved from Spring 2020 to Spring 2021. For the 12 months prior to the 2021 survey, faculty feedback and discussions were facilitated through department and school meetings, and a few faculty townhalls to address student feedback and curricular matters.

Contingency Planning

Contingency planning is the best way to prevent chaos, or additional chaos, in the midst of an unexpected event. For example, consider the preparations of individuals and companies before the year 2000 (Y2K) in case there were massive technological failures, and the preparations of individuals and companies after the terrorist attacks on 9/11/01 in case there were further terrorist attacks. A multitude of situations can occur on any given day; the better prepared a person or organization is to handle these situations, the better the reaction to and handling of the event will be. Depending on their work history, some employees may be familiar with contingency planning, but many are not. Illnesses, accidents, family situations, and campus closures are examples of why contingency plans are needed in higher education (Draugalis, et al., 2020).

As with any organization, backup personnel are essential for the McWhorter School of Pharmacy. A contingency plan was developed several years ago in the event a member of the Executive Council (EC) was unable to work for an extended period. The plan includes an alternate for each Executive Council member and states that cross-training will be done as time permits. This information was disseminated so all faculty know who is ‘in charge’ if a key leadership person is no longer available. During pre-COVID, when work-related travel was allowed, it was even requested that all members not travel using the same transportation (e.g., more than two or three members on the same flight). This was suggested based on travel policies of an EC member’s prior employer, which was a large non-profit organization.

Backups were also designated several years ago for each staff member, and cross-training was/is conducted whenever possible. Temporary staff backups were occasionally used when staff were absent for personnel or family health issues before and during COVID. They were also helpful in 2020-21 with the retirement of two long-term staff members, until replacement staff could be hired. Although utilization was more frequent, no changes to the Executive Council or staff contingency plans were necessary during the pandemic.

Most recently, in response to COVID-19, all course coordinators and instructors designated a backup coordinator/instructor for every course and topic in case the original person became ill or had a family emergency. This reassured everyone in the school that the PharmD semester(s) would have good continuity of instruction, i.e., could continue with as little instructional disruption as possible. A few backup instructors were utilized in Fall 2020, and fortunately none were needed in the spring 2021. Prior to COVID-19, if an instructor was sick, the lab/lecture was either cancelled and given a makeup date/time, or the order of labs/lectures was changed, and a different one took its place.

INTERPROFESSIONAL ACTIVITIES

Introduction

The World Health Organization defines interprofessional education (IPE), as "…when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes" (Gilbert, 2010, p. 10). The Interprofessional Education Collaborative (IPEC) was developed in 2009 to encourage the development and delivery of interprofessional education learning experiences for future healthcare professionals including dentistry, nursing, medicine, osteopathic medicine, pharmacy, and public health. The withstanding goal of IPEC is to prepare future health professionals for team-based care of patients and improve population health outcomes. In 2011, IPEC developed core competencies as a guidance to health professions educators in the development and integration of interprofessional learning experiences into their respective curricula. The most recently updated set of core competencies was published in 2016 (IPEC, 2016, p. 10). These competencies are listed in Table 2.

Table 2. IPEC core competencies

Competency	Statement
1	Work with individuals of other professions to maintain a climate of mutual respect and shared values. (Values/Ethics for Interprofessional Practice)
2	Use the knowledge of one's own role and those of other professions to appropriately assess and address the health care needs of patients and to promote and advance the health of populations. (Roles/Responsibilities)
3	Communicate with patients, families, communities, and professionals in health and other fields in a responsive and responsible manner that supports a team approach to the promotion and maintenance of health and the prevention and treatment of disease. (Interprofessional Communication)
4	Apply relationship-building values and the principles of team dynamics to perform effectively in different team roles to plan, deliver, and evaluate patient/population-centered care and population health programs and policies that are safe, timely, efficient, effective, and equitable. (Teams and Teamwork).

At the College of Health Sciences (CHS), it is essential for health professions students to gain an informed understanding of how healthcare operates early in their professional education and to apply these principles as they transition to practice. At the McWhorter School of Pharmacy, interprofessional education (IPE) is an important aspect of the current and future curricula and is necessary to train pharmacy students for the contemporary collaborative practice environment they will enter upon graduation. In 2013, the CHS convened a workgroup to develop a model for IPE at the CHS. This model is depicted in Figure 1.

Figure 1. Model of IPE at Samford University College of Health Sciences

Through real-world application of interprofessional collaboration, pre-professional students gain a more informed understanding of the moral, ethical, and legal issues in biological science, healthcare, and sharing of health data. They will remain mindful of these issues in their educational [e.g., introductory and advanced pharmacy practice experiences (IPPEs and APPEs)] and health professional careers. This in turn will to more positive patient-centered care and safety outcomes.

Incorporating IPE into the health professions' curriculum builds on examples of existing and innovative IPE and simulation educational experiences provided at the school. Interprofessional education enables students from all healthcare disciplines to increase communication and transfer early IPE experiences into preceptor-led practice experiences towards the conclusion of their education. Furthermore, students will be able to transfer these IPE competencies to their respective professions upon graduation. Interprofessional education also helps health professions students identify the importance of interprofessional communication, and a greater awareness of respective roles and responsibilities. The following subsection demonstrates a few pre-COVID examples of how the McWhorter School of Pharmacy engaged with other schools in the CHS to promote IPE in live/synchronous and online/asynchronous formats. COVID implications will then be presented.

IPE Learning Activity Developed for a Live, Synchronous Setting

Pharmacokinetic Dosing Simulation Activity between Pharmacy and Nursing Students

Pharmacists and nurses interact throughout the workday to provide optimal patient care. Pharmacokinetic consults are conducted by pharmacists particularly in the hospital setting to provide patient-specific dosing. Pharmacists must communicate effectively with nursing to not only retrieve clinical information about a patient through nursing staff, but they must also effectively communicate their accepted recommendations to nursing to ensure efficacy and mitigate adverse effects due to miscommunication.

Pharmacy and nursing faculty developed a pharmacokinetic consult interprofessional learning activity (Cropp, et al., 2018) incorporating IPEC competencies for participation by nursing and pharmacy students through a simulated experience using medium-fidelity manikins. Clinical cases were developed for pharmacokinetic dosing consults for five medications that traditionally require pharmacokinetic monitoring for optimally safe and effective therapeutic management. During this IPE learning activity, nursing students completed simulated patient assessments while pharmacy students collected the necessary information needed to complete their pharmacokinetic consult through the electronic health record and through professional questioning of the nursing students. The calculated empiric or adjusted dosing of these therapeutically drug monitored drugs was communicated by both pharmacy and nursing students using the Situation, Background, Assessment, and Recommendation (SBAR) approach (Institute for Healthcare Improvement, n.d.). After the IPE activity, all students were debriefed and surveyed to gather students' perspectives on what each student learned individually and from an interprofessional perspective. Table 3 contains the list of questions that were asked in the student survey.

Table 3. Survey questions for pharmacokinetic dosing simulation activity between pharmacy and nursing students

Survey Questions
1. What is your major field of study (nursing/pharmacy)?
2. What did you learn today?
3. What were your strengths during this activity?
4. What were your areas for improvement during this activity?
5. What recommendations for changing this activity do you have?
6. What did you learn about interprofessional collaboration?
7. What did you learn about the clinical application of kinetics in this simulation?
8. What is the one thing you like better about lecture sessions as compared to simulation sessions?
9. What is the one thing you like better about simulation sessions as compared to lecture sessions?
10. Do you have any additional comments about the simulation or suggestions for improving the interprofessional education in the College of Health Sciences?

One hundred nineteen out of 145 students participated in the survey, giving a response rate of 82%. Seventy-seven of the respondents (64.7%) were pharmacy students while 42 respondents (35.3%) were nursing students.

The survey responses revealed effective learning for both nursing and pharmacy as a result of collaborating to complete this simulated experience. For example, pharmacy and nursing students recognized the importance of communicating with each other for the well-being of patients. A pharmacy student noted, "I learned the importance of communicating with nursing and other staff about monitoring labs and administering doses"; while a nursing student noted, "Pharmacy and nursing must have good communication between each other to ensure best possible care of the patient". Not only did pharmacy and nursing students better appreciate the others' role on a healthcare team, they did so prior to beginning the advanced experiential phases of their respective degree programs.

IPE Learning Activities Developed for an Asynchronous Format

A unique aspect of certain CHS courses is the incorporation of asynchronous interprofessional learning activities integrated throughout the semester. CHS graduate nursing students, pharmacy students, master's in public health students, and dietician students enrolled in their individual courses for synchronous or asynchronous delivery through Canvas, were assigned into interprofessional groups by their respective course instructors, and then enrolled into a collaborative course space within Canvas to actively participate remotely in three IPE learning activities. Each group was similarly comprised of an equal number of students from each discipline. These IPE learning assignments included two discussion posts and the construction of a group proposal to develop and implement a program to address a real-life known health disparity of a third-world country, followed by a recorded group presentation.

IPE Race-Based Medicine Discussion

Each student in the CHS IPE groups was required to answer two out of four questions as initial posts to an assigned discussion forum in Canvas. These four questions were to 1) identify and explain the benefits and/or drawbacks of using race-based medicine to treat or group patients, 2) to state their views as to whether or not there is a link between race and disease, 3) to opine as to whether or not attempts of pharmaceutical companies and health advocacy groups to communicate to different groups about diseases that impact them is effective, and 4) to state their thoughts on how culture, genetics, and the environment may play a role in COVID-19 health disparities. All students were required to provide supportive evidence for their responses. After the end of the initial posting period, each IPE student was asked to respond with a substantive comment to two other students from another discipline or class in their group who had answered different questions from their own initial responses. Students were required to provide a reference and/or professional experience to support their responses.

IPE "The Immortal Life of Henrietta Lacks" Discussion

The second IPE discussion was a health ethics related discussion based on the across-course book club reading of "The Immortal Life of Henrietta Lacks" (Skloot, 2011). Each student in the CHS IPE groups were required to answer two of eight book club discussion questions as initial posts to an assigned discussion forum in Canvas. After the end of the initial posting period, each IPE student was asked to respond with a substantive comment to two other students in their groups from another discipline or class who had answered different questions from their own initial responses.

IPE Global Health Collaborative Proposal

Each IPE group was assigned to work together to construct a budgeted proposal for the development and implementation of a five-year program to address a real-life significant health-related issue that significantly impacts the public health of a third world country. The interprofessional intervention was required to be culturally appropriate, feasible, and effectively address the genetic and environmental aspects of the country's health disparity. Each IPE group proposal could incorporate educational policy, social, medical, pharmacotherapy, nutritional and/or other strategies that involve important stakeholders from the community, local government, non-governmental organizations, universities, schools, and other partners. All discipline-specific as well as general health and wellness recommendations for the development and implementation of each IPE group's program was expected to be incorporated. Each group project proposal was presented as an asynchronous recorded presentation for evaluation by consensus by each of the course coordinators from the independent courses.

At the end of the semester, students were asked to evaluate the IPE component separate from their native courses, and to provide reflective journal entries regarding each of the three learning assignments, as well as the IPE component overall.

IPE Teaching during COVID-19

Planning and pivoting this set of interprofessional learning activities for remote and/or hybrid learning model due to COVID-19 did not require much adjustment; there were already existing asynchronous organization of the CHS IPE activities due to incongruent course schedules and differing school and/or department requirements. Since all participating health profession curricula were being taught under completely asynchronous or hybrid models, planning logistics of each IPE activity was easier, and as such circumvented challenges with scheduling synchronous IPE learning activities. Teaching IPE activities following the end of the COVID-19 pandemic should continue to include a mix of synchronous and asynchronous activities in order to foster as many interprofessional experiences as possible and maximize participation. In future, the IPE global activity will be assigned earlier in the semester so that all student IPE groups will have more time to interact and coordinate their schedules to find times to meet in order to build their proposals given the differences in didactic schedules for pharmacy, nursing, and public health students.

Assessment Tools for Interprofessional Learning

Several quantitative and qualitative tools exist for evaluation of interprofessional students including surveys (Dominguez, et al., 2015), scoring rubrics, reflective journals, discussion boards, and selected journal and book club readings. An advantage of these tools is their relevance to any healthcare discipline. This allows for a more consistent way to grade these assignments within the interdisciplinary groups while assigning scoring for these learning activities within each respective discipline's course. Additionally, incorporating standardized patients and healthcare providers (e.g., licensed pharmacists, nurses, physicians, and other allied health professionals) within a realistic simulation environment provides a unique opportunity for students to apply the didactic content they have learned in a traditional lecture-style environment to the setting of a patient care scenario. This also provides unique opportunities for students to teach each other about their profession's future role in patient care.

CONCLUSION

Overall, continuing the health professions students' IPE learning experiences before, during, and after COVID a) strengthens students' collaborative learning experiences, b) reinforces core principles of interprofessional practice beyond graduation, c) develops strategies for curriculum development among health professions, and d) provides opportunities for research in interprofessional scholarship of teaching and learning. All of these benefits are in line with the overall goals identified by IPEC. In addition to the asynchronous activities, the pharmacy school was able to lead or participate in a few socially-distanced IPE events in Spring 2021, and the full complement will return in Fall 2021.

ADVANCED EXPERIENTIAL COURSES

Introduction

In March 2020, when the McWhorter School of Pharmacy had to move its curriculum online and change all instruction to virtual, faculty quickly realized that experiential instruction needed to change. This was an obstacle presented to most schools of pharmacy (Fuller, et al., 2020; Montepara, et al., 2021). Faculty would not be able to meet with students in person and they would not be able to attend practice sites or see patients. Fortunately, it was the end of the rotation cycle for the year, so there were only a few students who needed one more rotation prior to graduation. The school created a virtual Drug Information rotation that several faculty members facilitated for those students and ultimately all fourth-year students in the Class of 2020 had the opportunity to graduate on time.

Once the 2020-2021 rotation cycle started, faculty again realized they could not hold advanced pharmacy practice experience (APPE) rotations as usual, so the school split the rotation sites by practice type – ambulatory care, general medicine, and community. The practice faculty created contingency plans for each of these groups based on the global pandemic. These faculty members created contingency plans for different types of student interaction; completely online, hybrid, and completely in person. These plans would go in effect for any reason that a faculty preceptor was not able to go to the practice site. In the event of a second shutdown, preceptors that had virtual access to patients were identified in each of the pods. These steps were necessary to ensure that the Class of 2021 would be eligible for on-time graduation. The descriptions of changes to experiential rotations presented in this chapter are from a faculty preceptor perspective and not from the Office of Experiential Education.

The school also shifted some in-person learning to an online format. In some instances, this was a meeting with physicians, making phone calls to patients, or even topic discussions with preceptors. This decreased face-to-face time to help decrease the risk of spreading any infections. These changes and contingencies are important to continue post-COVID to ensure that the school and faculty have a plan for whatever may happen that will disrupt the normal learning environment. Much about healthcare has changed since the last pandemic in 1918, and hopefully some instructional innovations that were made in 2020 will change academic healthcare forever.

The School of Pharmacy's Redefining of Direct Patient Care

Many of Samford-McWhorter's APPE sites involved working with at-risk patients or COVID positive patients. This included patients who were in many different settings. The types of interaction ranged anywhere from filling prescriptions to rounding in patient rooms to administering COVID tests or vaccines to patients. To create safe spaces for students and preceptors, the school ensured that all students were given an opportunity before each rotation to receive an N-95 mask that could be worn at the practice site. Mask distribution occurred monthly at a drive-by location. Students were given one N-95 mask to wear for the course of their rotation and often would wear a washable mask on top of the N-95 mask. In addition, students needed to report any COVID exposure as soon as possible, and quarantine as needed. "Exposure" included any exposures that occurred at the rotation site or in the students' free time. Students often were asked to report symptoms and temperatures to their practice sites, and through a monthly school survey. The survey occurred electronically prior to the beginning of each rotation. By the end of the rotation year, many sites were administering vaccinations to patients, so screening patients for COVID illness, and exposure and recent treatment was an important part of patient care.

Throughout the year and in many differing situations, experiences that had previously been face-to-face were being done virtually. Often these experiences were moved online to help ease of discussion and eliminate commuting, but when a student or preceptor was in quarantine, the option of virtual experiences was beneficial. Examples of experiences that worked well online included topic discussions, journal clubs, and patient case presentations. All of these are required for fourth-year pharmacy students to complete, and the online mode often made the conversations more in depth versus in-person with a mask or face shield. One caveat to a virtual experience is not being able to account for the time spent on rotation, so many of the faculty would assign the topic in the morning and then meet for discussion in the afternoon, to ensure that the student was actually working on the topic during their assigned day. This online learning format generally increased the time that APPE preceptors were able to spend with students, leading to a better rotation experience, which is something that many preceptors hope to continue even after the pandemic. Instead of having students at their practice sites in the mornings, then completing assignments in the afternoons, the preceptors were able to perform check-in discussions in the afternoons. This type of learning also was met with several challenges:

- Internet service was not always available and reliable,
- Many students were apprehensive to let others view their home environment,
- Many individuals did not properly use the "mute" button (were muted or unmuted at the wrong moments), and
- Each group of physicians and learners used a different program and switching between the programs was difficult and often frustrated users.

Even with these and other challenges, the ability to see patients and meet with physicians virtually far outweighed the alternative of not being able to complete rotations.

In the early part of the spring and summer 2020 state-wide lockdown and quarantine, many providers moved their patient appointments to telehealth and phone calls or even drive-through clinics. This created issues once APPE students were back on rotation and desiring direct patient care. Most practice sites were able to complete some tele-pharmacy visits and could even complete these assessment calls through different Health Insurance Portability and Accountability Act (HIPAA)-approved apps that would disguise the provider's phone number as the clinic number. HIPAA ensures that national standards are protecting sensitive patient health information from being shared without patient knowledge (HHS, 2013). This flexibility allowed for more direct patient care before patients were permitted back in doctor's offices.

The option for telehealth assessments has given a new layer to patient care and will hopefully continue even after the pandemic is over. Students were able to talk to patients while the patient stayed at home where they were more comfortable and had access to medications to answer questions or had a caregiver close at hand. Many of the patient responses were more reliable due to these small changes. The other benefit was less time spent in a waiting room. Patients really enjoyed the increase in their time and flexibility for appointments when they did not have to drive to a clinic and wait for their appointment time. When completing tele-pharmacy calls on rotation, students often found more meaningful conversations and left fewer voicemail messages because patients were at home due to the pandemic. Access to patients increased when everyone was staying home and needed a virtual visit. Since direct patient care is what drives the school's APPE experiences, this change in the definition of direct patient care has opened many doors for future interactions with patients. Although students would always rather see a patient in person, students enjoyed the interaction with patients and were always interested to hear what patients were dealing with throughout the pandemic.

Another aspect of patient care that pharmacy students were involved in during a normal rotation was meeting with a provider. Whether this was through rounds, patient conferences, or learning seminars, pharmacy students were often in situations where they learned from or with other professions. These meetings were held virtually through HIPAA-compliant platforms like Physician Zoom. All providers and students were able to log on from their home or practice site and participate in discussions about patient care. As with any online meeting, there were some challenges that included internet connections, proximity to a microphone, sharing screens, people on mute, and a lack of good banter back and forth between providers. While online meetings often require a muted microphone, it was important to encourage others' participation in the patient discussion. Knowing all these shortcomings, online meetings were better than no meetings at all. Once the number of COVID cases began declining in-person meetings returned, but with social distancing and infection control measures. Adding an online option to all face-to-face meetings would increase the number in attendance, but it also increases risk if the information were shared in a non-HIPAA-protected environment.

Contingency Planning

When the pandemic began, the pharmacy school quickly realized it needed a backup plan for everything to maintain continuity of instruction and overall operations. As mentioned earlier in the chapter, faculty chose backup course coordinators and instructors for didactic teaching, but they also made backup plans for APPE rotations. As differing faculty have agreements at differing sites, having a backup was more complicated in APPEs. In place of assigning a person as backup, the school split the faculty (rotations) into pods based on their practice type. Most rotations fell into general medicine, ambulatory care, or community. The specialized rotations were added to the pods in which they fit best. For example, general medicine pediatric rotations were added to the general medicine pod. Each of the pods was tasked with coming up with contingency plans in case of emergencies. For example, the ambulatory care pod created an online resource of topic discussions and how they could accomplish all the required tasks if students were not able to go to rotation sites. They also discussed which of the sites had access to patient care from home, and developed plans to rotate students through different preceptors to ensure that the students were graduating prepared to become successful pharmacists.

The other area that the school had to discuss was how to handle COVID positives with their APPE sites. As discussed earlier, students were asked to report any symptoms or exposure, so they were required to screen daily. Preceptors were required to do the same. If anyone on rotation tested positive, the entire group had to quarantine for ten days following the exposure. According to the school's COVID guidelines, the person who tested positive had to report a positive test within 24 hours to the school's COVID tracers. The tracers then asked the positive person the names of people with whom they had come in contact at least 48 hours prior to the positive test or any symptom. Often this was the preceptor and other students on rotation. The tracer then was put in touch with the contacts to screen for symptoms of COVID. From the time of first symptom, the person who tested positive as well as any close contacts had to quarantine for ten days. Any other contacts at the practice site that were not associated with the school were able to follow site-specific protocols. The quarantine period was when it was especially important to have a contingency plan in place. Many of the online resources were used during the quarantine period and students were given extra projects and assignments to complete on quarantine in lieu of face-to-face interaction and direct patient care.

The school also began COVID testing both faculty and students. Faculty had to submit a negative at-home COVID test prior to returning to work each semester, and didactic students were required to get tested as well. However, this testing was not required for the APPE rotation sites. Some sites required a negative test or routine testing. Once the school started sentinel testing in Spring 2021, students and faculty were called randomly to participate in sentinel tests. The tests were completed locally, and students and faculty were able to schedule a time to be tested that was conducive to their schedules. If a student or faculty member required a test because of positive symptoms or exposure, the test had to be obtained off campus. Many of these tests were difficult to find at the beginning of the pandemic and caused a long delay in returning to work. As the rapid tests became more readily available, it was easier to send a student or faculty to be tested before allowing them to return to their practice sites.

Students were very concerned with on-time graduation and wanted to do everything they could to ensure there were no issues that would preclude them from graduating at the end of the academic year. This concern was cause for students to avoid reporting symptoms and positive exposures. Students were hesitant because a quarantine may have caused them to need to repeat a five-week rotation. The hesitancy may have led to students spreading COVID to fellow students and faculty members or causing extended quarantine times. Faculty had to explain to students that it was easier for them to be honest and upfront about any of their health issues or symptoms as well as exposures rather than making the entire site quarantine for an extended time period. There were groups of students that, if under quarantine, would have affected up to ten students and five faculty members, so making sure that students were honest and up front was of utmost importance. Faculty ensuring students that there would be no effect on their grade or their ability to pass the rotation gave students more assurance when informing about a possible exposure. The virtual options for different patient care and discussions allowed students to still participate in daily activities even if they were not allowed on campus or at their practice site.

At the end of both the 2020 and 2021 rotation years, it was reported that no students were delayed in graduation due to COVID-related illness or rotation logistics. The school was completely virtual during the lockdown, but many students were able to complete in-person rotations throughout the year. The graduating class of 2021 did not have any completely 'locked down' rotations and depending on the practice site, some faculty preceptors took students in person starting at the beginning of the school year while others had practice sites that never reopened. The school and faculty were successful in helping students to stay on track with their required rotations and complete their daily patient care activities in new formats. At the beginning of the year, when many rotations were not taking students, the school was able to successfully move students schedules around to accommodate these changes.

Through teaching APPE students during this global pandemic, the school realized how little-prepared it was for a disaster of this proportion. Faculty made contingency plans, changed how their students were taught, provided direct patient care, and had provider interaction, but it was not easy and it did not happen overnight. Now the school will be more prepared in the future for any issue that may delay or deter direct patient care, and the faculty will all value their face-to-face time with students and patients. While the faculty and students were eager to get back to what they considered to be normal, there were many lessons that the school learned from this that will not be easily forgotten. The faculty and students hope they all will continue to have a contingency plan, have some type of a virtual option, wear masks if they are sick, be transparent about their health issues, and continue to share ideas of successful rotation experiences.

SOLUTIONS AND RECOMMENDATIONS

Whether or not there are continued pandemic protocols, there are many solutions and recommendations that Samford University can offer other universities, schools, and programs. As mentioned throughout the paper, Samford University was able to maintain hybrid delivery with minimal COVID cases on campus. The authors will focus on course strategies here versus health precautions and protocols:

- Set minimal yet robust device specifications for incoming students. Require Internet access and designate a minimum optimal speed for all students and employees. Purchase enough loaner devices (laptops/tablets) for emergencies, such as broken screens, hard drive failures, or theft.
- Determine which courses can ideally be delivered in an asynchronous online format. This will make physical space available for additional sections of on-campus (or hybrid) courses. Divide large courses into sections to assist with social distancing.
- Develop specifications for the volume of online and in-person content that is appropriate per credit hour. Refer to guidance from your university and accreditor(s). Inconsistency across courses, especially if an overload, will be noticed and voiced by students.
- Limit in-person laboratories to the crucial components. To assist in this, provide online directions and tutorials for laboratory activities in advance of the live sessions. Likewise, for didactic courses, offload the lecture component to online. This will provide class time for instructional methods that focus on application of the content. However, ensure that your online content includes videos of your instruction; students want to hear faculty explain the concepts.
- Investigate and/or strategize new interprofessional and/or clinical experiences, such as incorporating telehealth, even if your facilities return to 'normal'. These options can be utilized in other scenarios, such as influenza outbreaks, and they can offer new methods of learning for your students.
- Plan and prepare for the worst but hope for the best. Designate and communicate a point of contact for class absence approvals, exam technology problems, mental health red flags, etc. Develop

contingency plans for various levels of university or clinical site closures, instructor absences, preceptor absences, and student makeup options. Allow remediation as appropriate.

- Get feedback from your stakeholders – students, faculty, staff, and preceptors. If something is very wrong, fix it now; do not wait. Problematic experiential site? Remove your students. Too much course content? Check the online content and speak with your faculty about modifications. Exams too long/fast? Add 10-15 minutes, remembering that many students are juggling school, work, and family obligations.
- Show grace and flexibility whenever possible. Do not discount the pandemic's effects on physical and emotional wellness. If possible, provide both daytime and evening options for office hours and review sessions. If tests are administered remotely, consider testing windows (e.g., 5am-10pm) instead of specific test times.
- If your program needs to make temporary changes that may not comply with accreditation standards, communicate the situation with your accreditor. Request (if needed) a temporary waiver. Keep your stakeholders safe, but also protect your accreditation status! If the accreditor declines your request, find a new solution.

Samford University is proud of its operations over the past 18 months and counting. It is a reflection of its strategic, hard-working, and student-centered employees, and its resilient students. See Table 4 for challenges and opportunities that have been encountered at the McWhorter School of Pharmacy.

Table 4. Pandemic challenges and opportunities

Challenges	Opportunities
Social isolation prior to hybrid semesters	Resilience, collegiality, caring, and helpfulness of the school was even more evident during these times
Environmental impact on remote student testing (e.g., caring for parents, quarantined and/or home-schooled children, noisy neighbors, stress)	School responsiveness to student needs (e.g., alternate testing schedules, online office hours)
New modes and methods of teaching and learning for faculty, preceptors, and students	Piloting of new (to this program) teaching modes and methods; adaptation and acceptance by most faculty, preceptors, and students; lessons learned can be applied to the upcoming new curriculum
Possibility of employees becoming sick, quarantined, and/or having family members affected by COVID-19	Contingency planning expanded from the staff and Executive Council members to include instructors and preceptors

FUTURE RESEARCH DIRECTIONS

As the COVID-19 pandemic ebbs and flows towards a non-pandemic categorization, many research opportunities have surfaced or resurfaced. Those related to technology include remote testing and security; remote learning for multiple learning styles; simulation opportunities; telework opportunities for faculty and staff; and telehealth opportunities for faculty clinicians and their healthcare students. The pandemic has also shown the need for continuing research on education strategies for students with cognitive, physical, and/or socio-economic special needs, and the impact of home environment on remote learning.

Lastly, the COVID pandemic has had a widespread psychological impact of varying degrees. Therefore, research should continue in the areas of wellness and resilience, notably on coping with social isolation and coping with the unknown.

CONCLUSION

Change is inevitable in any year. However, the high level of modifications in Spring 2020-Spring 2021 proved that when given a challenge, faculty, staff, and students are open to change and new opportunities, and when given the right tools and support, they can thrive under any circumstance. As schools move forward beyond the COVID-19 pandemic, this year of growth should remind universities of the resourcefulness of its employees and students. Faculty learned about new models of teaching, new online technology, and new medical safety protocols. Students learned to adapt to new opportunities and new learning environments. Practice sites often had to learn how to operate without their onsite support from students and faculty members. Educational institutions across the globe have had to modify their activities and experiences, and people have learned that change is not always bad. Change can often lead to new innovations and opportunities that may never have been discovered otherwise. Students and faculty in healthcare programs and employees in healthcare professions are now at the forefront of these opportunities.

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KEY TERMS AND DEFINITIONS

ACPE: Accreditation Council for Pharmacy Education, a professional pharmacy program accreditor.

Active Learning: The incorporation of instructional activities within a curriculum that requires students to perform an activity and reflect upon what they are doing.

APPEs: Advanced pharmacy practice experiences. Course series that occurs after all required didactic courses and introductory pharmacy practice experiences are complete. APPEs are typically 4-6 weeks long and occur in the last one or two years of a Doctor of Pharmacy (PharmD) program. The APPEs at this school are 5 weeks in length.

Canvas: Well-known web-based learning management system used in higher education.

CHS: College of Health Sciences.

HIPAA: Health Insurance Portability and Accountability Act of 1996. A federal law that required the development of national standards to secure patient health information and to not share that information without prior patient consent.

Hybrid Learning: A blended instructional approach where the didactic material is presented in an online and in-person format.

IPE: Interprofessional education. Education that includes learning from, about, and with students and professionals in other disciplines. The disciplines are generally healthcare professions.

IPEC: Interprofessional Education Collaborative.

IPPEs: Introductory pharmacy practice experiences. During the didactic portion of a PharmD curriculum, these are primarily off-campus courses in which students gain initial hands-on pharmacy practice experiences. Depending on the pharmacy school, these experiences may occur in the fall, spring, and/or summer.

SACSCOC: Southern Association of Colleges and Schools Commission on Colleges, a regional university-level accreditation agency.

Chapter 7
Navigating Performance-Based Assessments in Unprecedented Times:
Adaptations, Challenges, and Strategies

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ABSTRACT

This chapter focuses on the implementation of performance-based assessments (PBAs) at the Auburn University Harrison School of Pharmacy (AUHSOP) during the COVID-19 pandemic, when shifts were made to a fully remote delivery of the pharmacy curriculum in March 2020 and then altered to a hybrid delivery in the fall semester in which students returned to campus in a limited capacity. In addition to describing adaptations made due to curriculum delivery changes for each professional year, the chapter will provide specific challenges encountered while planning and implementing PBAs with a focus on factors related to students, standardized persons (SPs), and logistics. Student and SP perceptions of remote PBA delivery will be presented as well as strategies for improvement of future PBA events.

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INTRODUCTION

The Auburn University Harrison School of Pharmacy (AUHSOP) is a four-year professional program that prepares students for entry into the profession of pharmacy. Students complete three years of predominantly classroom and lab-based learning experiences prior to completing a final year of clinical clerkships. Prior to COVID-19, the AUHSOP had recently undergone a curriculum redesign, establishing a competency-driven, practice-ready curriculum for the Doctor of Pharmacy program. Using a backwards course design process (Wiggins et al., 2005), the Practice-Ready Curriculum (PRC) was developed to prepare student pharmacists for practice through integrated learning experiences and robust assessment approaches (Hornsby & Wright, 2020; Wright et al., 2018). The didactic curriculum is divided into 12 Integrated Learning Experiences (ILE), six Longitudinal courses, and six one-week Workshop courses across the first three professional years of the curriculum as illustrated in Figure 1. Student pharmacists are assessed on predetermined competencies through a variety of knowledge-based, skills-based, and practice-based assessments that are held throughout and at the conclusion of each academic course. As a component of the curricular assessment strategy, performance-based assessments (PBAs) are held at the end of each ILE for each professional year (PY) and consist of assessments designed to evaluate student pharmacist's knowledge and ability to conduct clinical skills. Assessment scenario examples include patient interviewing and counseling, healthcare provider consultations, development of a comprehensive assessment and plan, and utilization of healthcare technology such as electronic health records (EHR) and prescription dispensing software. Typically, these assessments occur in an environment that simulates a patient care setting or a secure, controlled testing environment with each assessment duration ranging from 10 minutes up to two hours. Assessments that include interpersonal interactions are most often conducted with the use of standardized persons (SPs) who portray the role of a patient, caregiver, or healthcare provider. Most of these interactions are graded in real-time by another trained SP or faculty member. Generally, SPs were hired to serve as both an actor and a grader, alternating between these roles throughout the assessment period. Assessment of student pharmacists for interpersonal interactions involved completion of a unique analytical checklist focused on their ability to meet the objectives of the interaction and a standardized communication rubric focused on communication and interpersonal skills (Ford et al., 2019). Typically, these assessments are delivered as stations which student pharmacists rotate through consecutively. An in-depth overview of the AUHSOP PBA process has been previously published (Ford & Kleppinger, 2020).

In the Spring of 2020, the COVID-19 global pandemic led to significant changes in many facets of daily life, particularly in the education system. Universities, colleges, and schools throughout the United States transitioned to remote learning in March 2020, including Auburn University (Auburn University, 2020 March 12). While the AUSHOP has been operating a satellite campus since 2007 with synchronous learning via Zoom (Zoom Video Connections, Inc, 2020), the curriculum and assessments were focused on traditional methods of in-person delivery. With the transition to virtual learning, the program's method of instruction and related assessments required a timely and innovative restructuring. The preliminary adjustments included the transition of teaching lecture-based and active learning activities to a virtual format. This led to significant alterations in the delivery of assessments. While a restructuring of this nature would typically require reporting and approval from the Accreditation Council for Pharmacy Education (ACPE), temporary substantive changes to the curriculum due to COVID-19 pandemic restrictions were waived if they were not in violation of ACPE standards (ACPE, 2020 August; ACPE, 2015).

Figure 1. HSOP practice-ready curriculum core didactic coursework

FALL SEMESTER			SPRING SEMESTER		
Professional Year 1					
ILE 1* (6 weeks)	Workshop 1 (1 week)	ILE 2* (6 weeks)	Workshop 2 (1 week)	ILE 3* (6 weeks)	ILE 4* (6 weeks)
Longitudinal 1 (12 weeks)			Longitudinal 2 (12 weeks)		
Professional Year 2					
Workshop 3 (1 week)	ILE 5* (6 weeks)	ILE 6* (6 weeks)	ILE 7* (6 weeks)	Workshop 4 (1 week)	ILE 8* (6 weeks)
Longitudinal 3 (12 weeks)			Longitudinal 4 (12 weeks)		
Professional Year 3					
ILE 9* (6 weeks)	Workshop 5 (1 week)	ILE 10* (6 weeks)	ILE 11* (6 weeks)	ILE 12* (6 weeks)	Workshop 6 (1 week)
Longitudinal 5 (12 weeks)			Longitudinal 6 (12 weeks)		

This chapter will focus on the challenges and adaptations made with PBAs because of the COVID-19 pandemic and university-wide shifts to remote and then hybrid teaching and learning methodologies. For the purposes of this chapter, the authors define PBAs as assessments requiring a student to perform or complete a clinical skill or series of skills. The authors will describe how in-person PBAs were transitioned to online activities in the spring semester 2020 and how they evolved in the fall semester under a hybrid academic model allowing students to return to campus in a limited capacity. Student and SP perceptions of modified PBA delivery will be presented through survey data results. Challenges encountered with PBA planning and implementation will be presented with a focus on student, SP, and logistic factors. The authors will also describe some of the opportunities identified for future improvement in these types of assessments after pandemic restrictions have been lifted.

BACKGROUND

The inclusion of performance-based assessments within health professions education has been well established in the literature as an effective method for evaluating student progression with clinical skills (Daniels & Pugh, 2018; Harden et al., 1975; Harden, 1988; Schwartzman et al., 2011). PBAs are often formatted as objective structured clinical examinations (OSCEs) as this approach allows educators to evaluate a student's clinical competence while also evaluating learners on their oral communication skills (Harden, 1988; Schwartzman et al., 2011). Considered to be valid and reliable forms of assessments, OSCEs are generally designed as a series of stations, with each station testing learners on one to two skills. (Harden, 1988; Schwartzman et al., 2011). As more health professions programs have transitioned to a competency-based curriculum, the integration of assessment approaches has evolved to include various performance-focused assessments such as the mini-clinical evaluation exercise, simulated chart reviews, and directed observations during clinical placement (Alpine et al., 2020; Boulet & Durning, 2019).

Prior to the COVID-19 pandemic, few programs offered PBAs using a virtual platform (Hopwood et al., 2020; Prettyman et al., 2018). The pandemic-induced shutdown forced educators to reevaluate their assessment strategies resulting in the integration of virtual assessments (Savage et al., 2021; Scoular et al., 2021; Updike et al., 2021). The inclusion of PBAs within curricular assessment in health professions education is quickly being recognized as essential as it allows educators to evaluate their learners systematically and consistently for practice-readiness (Tabatabai, 2020). The adaptability of PBAs allows educators to shape the assessment experience to fit the needs of the academic program as well as the student while minimizing the loss of the intended experience. This adaptability is already being well documented in the literature and may result in increased utilization (Ali, 2020; Mirzaian & Franson, 2021; Scoular et al., 2021). The virtual format also allows for increased flexibility within both design and implementation, providing programs that have already transitioned to an online curriculum to reduce student burden related to travel costs and missed clinical experiences (Prettyman et al., 2018).

Early findings revealed that the overall performance of students is not negatively affected with this new assessment approach. Scoular et al. (2021) have found that the integration of virtual assessments did not diminish their ability to evaluate student learning. The study found that students' abilities to learn and refine their patient communication skills improved with the implementation of this new learning and assessment approach; however, it should be noted that the effect size of the study showed limited differences between performances. As pharmacy education begins its transition back to the world's 'new normal', educators will need to adapt to the educational changes that were achieved during the pandemic and utilize what they learned to continue to improve their teaching and assessment approaches (Ali, 2020).

PBA ADAPTATIONS DURING THE COVID-19 PANDEMIC

When the decision was made to switch all campus activities to a remote format halfway through the Spring 2020 semester, alternative PBA delivery had to be planned and formatted in a brief amount of time. Fortunately, mid-semester PBAs had been completed for each class prior to the remote format switch in March, so modifications were only needed for PBAs scheduled at the end of the semester. Both student and SP related challenges were present with making modifications to a fully remote environment and when in-person activities were allowed. While the AUHSOP utilizes PBAs across the curriculum, how each PBA is designed, implemented, and assessed often differs across the learning experiences. As such, it was challenging to design a universal process for making the transition from in-person to remote assessments. As each assessment period included differing complex elements, the authors will share how each assessment strategy was approached for each academic year.

First Adaptation – Spring 2020

While making the adjustment to fully remote delivery, the authors aimed to keep the assessments as intact as possible due to the nature of the competency-based curriculum. Solutions to this fully remote environment required adjusting for communication through online technologies, such as Zoom, factoring in for a lack of student supplies, and troubleshooting when students would not have a partner for demonstration. For several assessments requiring a face-to-face interaction, the setting was changed to telehealth with students interacting with remote SPs. For these stations, students were assigned a specific time to call into Zoom and complete the interaction with both parties calling in from a private location. A major adjustment with this method of delivery was the necessity to conduct one station at a time to streamline student scheduling and to limit the number of concurrent Zoom meetings to prevent system overload. Limiting the number of concurrent calls also allowed coordinators to better manage technology issues. With this change, most days only had one PBA station occurring as opposed to previous years which would have typically 4-6 different stations. When developing assessments requiring written information, students remotely completed them using Honorlock (Honorlock, Inc., 2020), a web browser lockdown system, and Canvas (Instructure, Inc., 2021), a learning management system (LMS). Activities requiring materials or demonstration of a skill such as blood pressure measurement were adjusted to accommodate for lack of materials and a partner to demonstrate those skills. For activities which required a face-to-face interaction or specific supplies (e.g., non-sterile compounding demonstrations), the assessments were removed from the course and points adjusted accordingly after review by the curriculum committee.

Another major adjustment from typical PBA operations was the method of delivery for case information. Traditionally, all station-related information is provided immediately as the station begins and students are provided with time to prepare for the interaction. Logistical constraints forced this aspect to be removed from the Zoom interaction due to concerns with security of the assessment materials while allowing students adequate means to review the materials. As a result, students were provided access to the case materials prior to each interaction instead of attempting to share the documents via Zoom. The time allotted for review varied with each station depending on the case scenario and skills required. Overall, this adjustment was not ideal as it provided students with assessment information during an unsupervised period, which raised concerns for assessment integrity.

Professional Year 1

Prior to the pandemic, PY1 students completed individual and group interactive PBA stations in addition to non-interactive scenarios. Adjusting to remote delivery involved changing to telehealth delivery, modifying software utilized for the assessment, and removing station content from the overall assessment plan. PY1 students were able to complete three stations for the ILE 4 PBA in spring 2020. These included two interactive scenarios altered to a telehealth format and one non-interactive case-based scenario. Other than the change in delivery, no major changes were made to the checklists and rubrics used to evaluate student performance.

The two interactive cases involved interviewing a patient with a self-care complaint (cough/cold and a dermatologic condition), recommending an over-the-counter (OTC) product, and counseling the patient on the chosen product. Students were provided with the necessary case information prior to initiating their encounter; however, during the interaction they were not able to utilize any resources. Students were permitted a half-sheet of paper with notes to use during the interaction. While giving students more information in advance did allow them to prepare for the PBA more adequately, the main goal was to demonstrate competence in interviewing and counseling patients, which was still achieved through remote delivery of the interactive cases.

Students also completed a non-interactive case focused on utilizing information from a patient health record to answer a series of questions. This station was completed on Canvas as a quiz with HonorLock launched in the background for remote proctoring. Time for this station was increased from 10 minutes to 20 minutes to allow for navigation of software and potential slow internet connectivity. After significant connection issues arose during class sessions while using an EHR, it was decided to remove this component from the PBA and use a printout of a progress note from the system instead of having students log in and access the information. Students were able to use a drug information resource in addition to the patient progress note to answer case-based questions, resulting in a similar experience to when the assessment was conducted in person.

As a result of the pandemic, several cases included in the original assessment plan were removed from the spring 2020 semester. The planned PBA for nonsterile compounding was not completed in spring 2020 since students were not able to complete these skills activities remotely. Plans were made to incorporate the removed assessments into the PY2 fall semester for this student cohort. This ensured that the competencies and skills would still be assessed as part of the curriculum-wide assessment plan. A second casualty of the pandemic was a group PBA focused on health and wellness topics, originally included in the assessment plan for the Longitudinal 2 course. While the skills practice was conducted remotely, there was hesitation about conducting a group PBA in the remote setting, mostly because of inability to ensure a smooth delivery with all students and the SP connecting from home. Faculty determined these skills would be better assessed through skills checkoffs already incorporated into PY2 and PY3.

Professional Year 2

Significant adjustments to the assessment plan were also made for PY2, including the elimination of basic skills checkoffs. One key element of the planned ILE 8 PBAs was the completion of blood pressure and blood glucose meter skill demonstrations. The goal of these assessments was to assess a student's ability to accurately conduct basic skills prior to their experiential learning activities. The decision was made to remove these assessments rather than adapt to a virtual assessment modality due to the emphasis on skill accuracy and plan for similar skill demonstration assessments in PY3. Points for these assessments were re-assigned to other aspects of the ILE 8 PBAs. The remaining aspects of the ILE 8 PBAs consisted of a written patient care assessment and plan followed by two interactive stations.

Students were provided with two hours to evaluate a patient case, formulate an assessment of the health conditions, and develop a treatment plan. The patient case was delivered to students through a Canvas assignment and students were permitted to use class handouts and online resources to support their recommendations. The two interactive stations were developed to be related to the written patient care assessment and plan but provided a different patient to avoid creating a scenario where an incorrect answer to one component would cause the student to fail all the assessment components. The provider interaction consisted of a dialogue between a physician and the student pharmacist regarding a treatment guideline-driven medication decision. Students were expected to evaluate the scenario and either recommend starting or withholding therapy. After deciding, students were guided to provide a rationale for this decision based on evidence-based practice. The last component of the ILE 8 PBA was the patient interactive station. In this scenario, an SP portrayed a patient at the pharmacy picking-up a new prescription for a medication used to treat a related medical condition from the patient care plan. As with PY1, no significant modifications were made to assessment instruments for the PBAs students completed.

Professional Year 3

The Spring 2020 semester marked the first iteration of PY3 of the PRC; therefore, adapting the assessment strategy to remote delivery proved daunting as there was no historical precedence. As the final semester of the traditional curriculum, the initial assessment strategy included a clinical skills competency assessment (blood pressure and blood glucose), an ambulatory care interaction (a clinical interaction with an assessment and plan), and inpatient clinical consult responses (medication recommendations).

Due to limited and inconsistent access to equipment and resources, students were tasked with developing creative instructional videos to demonstrate two clinical skills, blood glucose meter use and manual blood pressure technique. The blood glucose meter instructional video was developed for patient-viewing, providing detailed steps for taking and monitoring blood glucose. While specific materials were not needed, students were instructed to provide counseling on a specific type of blood glucose meter to streamline grading. Examples of student submissions included PowerPoint presentations, videos, photos, and websites. To assess a student's preparation for their clinical rotations, students were also tasked with developing an instructional video to teach an incoming PY1 student on how to take a manual blood pressure. These videos also did not require the use of specific instrumentation and allowed students to creatively navigate their instructional approach. Changing the intended audience allowed for a realistic evaluation of technical skills not normally communicated to patients in a real-world setting.

The ambulatory care interaction was originally designed to include student review of a patient health record (20 minutes) followed by an in-person interaction with a provider (10 minutes). The overall time allotted for this station remained consistent with the pandemic adaptation; however, students were no longer required to interact with a provider. Instead, students were tasked with leaving a voicemail message outlining their assessment and plan.

The initial design of the inpatient clinical consult was a classroom-based assessment allowing all students to complete it concurrently within a common space. Utilizing Canvas, students were challenged with reviewing patient scenarios and providing a written detailed response to the provided consult inquiries (60 minutes). The objectives of this assessment remained the same despite transitioning to a remote delivery. As the assessment required students to evaluate a medication regimen, students were authorized to access Lexicomp (Wolters Kluwer Clinical Drug Information, Inc., 2021) as their drug information resource. The interaction between Honorlock and Lexicomp caused logistical problems as students were required to connect to the university provided virtual private network (VPN) prior to starting their assessment to navigate between the programs. These difficulties in accessing needed information resulted in students completing the assignment at varying times throughout the day.

Student and SP Feedback

Since remotely administered PBAs were a new assessment approach, a brief survey was sent to students across all three years at the end of the spring 2020 semester to determine their perspectives. Table 1 summarizes the student survey responses. A total of 141 students (31.5%) completed at least one question on the survey. Response rates were similar between the three class years [PY1 46 (32.6%), PY2 43 (30.5%), PY3 52 (36.9%)]. Students had mixed feelings regarding this new format, with some indicating they felt more comfortable with the virtual format while others preferred face-to-face interactions with the 'patient'. Students indicating their preference with the virtual environment spoke to the level of comfort they felt being in their own space rather than the skills lab. Students who indicated a preference for in-person interactions noted they felt a loss of connection with the 'patient' as they were unable to engage using positive eye contact. Connectivity issues also posed challenges as students who experienced connection problems during other educational experiences noted an increased anxiety leading up to the PBAs due to concerns regarding whether they would lose time on the assessment because of connection issues.

Table 1. Student survey responses

Survey Question	N	Strongly Agree n (%)	Agree n (%)	Neither Agree nor Disagree n (%)	Disagree n (%)	Strongly Disagree n (%)
I was engaged in the assessment process to a similar degree (or level) as when I participate in face-to-face encounters.	141	45 (31.9)	45 (31.9)	12 (8.5)	28 (19.9)	11 (7.8)
The standardized persons (SPs) I interacted with virtually appeared comfortable within the interaction.	100	45 (45)	39 (39)	9 (9)	6 (6)	1 (1)
I felt the SPs completed the encounter in a professional manner.	99	55 (55.6)	35 (35.4)	7 (7.1)	2 (2)	0 (0)
I enjoyed the PBA process in this new format.	141	31 (22)	26 (18.4)	18 (12.8)	37 (26.2)	29 (20.6)
I would be open to completing assessments virtually in the future.	139	39 (28.1)	39 (28.1)	19 (13.7)	20 (14.4)	22 (15.8)
I found my level of engagement was consistent as with what I experience during face-to-face encounters.	138	34 (24.6)	42 (34.3)	9 (6.5)	39 (28.3)	14 (10.1)
I found participating in assessments in this environment enjoyable.	141	34 (24.1)	26 (18.4)	26 (18.4)	29 (20.6)	26 (18.4)
I found the assigned time for the assessment to be manageable.	141	33 (23.4)	57 (40.4)	9 (6.4)	25 (17.7)	17 (12.1)
I found my ability to assess and communicate with a patient comparable to face-to-face interactions.	118	30 (25.4)	40 (33.9)	12 (10.2)	23 (19.5)	13 (11)
I found the technology utilized was acceptable for the assessment.	141	38 (27)	57 (40.4)	19 (13.5)	18 (12.8)	9 (6.38)

To examine the perspectives of SPs who acted or graded remote PBAs, a brief survey was distributed at the end of the Spring 2020 semester. Table 2 summarizes the SP survey responses. A total of 16 SPs responded to the survey (100%). The overall perspectives were positive with a majority noting that they felt as engaged with the students in this format as the in-person experiences. Several SPs preferred grading after the event rather than during the encounter which is consistent with feedback received prior to the pandemic. With the format change, SPs were no longer able to give in the moment coaching to their acting partners which some felt was essential for performance consistency.

Second Adaptation – Fall 2020

During fall semester 2020, Auburn University implemented a hybrid-model for course delivery (Auburn University, 2020 May 29). The goal was to provide a safe and engaging environment for student learning while allowing for some in-person activities. Within AUHSOP, the primary goal was to continue in-person delivery of classes and assessments as much as possible while following appropriate physical distancing recommendations. Upon review of the spring semester, many aspects of virtual PBAs were deemed successful by the skills lab coordinators since survey results from SPs and students were generally positive and student performance was similar compared to previous years. Returning to in-person

Table 2. SP survey responses

Survey Question	N	Strongly Agree n (%)	Agree n (%)	Neither Agree nor Disagree n (%)	Disagree n (%)	Strongly Disagree n (%)	N/A
I was engaged in the assessment process to a similar degree (or level) as when I participate in face-to-face encounters.	15	8 (53.3)	6 (40)	1 (6.7)	0 (0)	0 (0)	
The student pharmacists I interacted with virtually appeared comfortable within the interaction.	15	7 (46.7)	8 (53.3)	0 (0)	0 (0)	0 (0)	
I felt that the students completed the encounters in a professional manner.	16	10 (62.5)	6 (37.5)	0 (0)	0 (0)	0 (0)	
I enjoyed having the opportunity to interact with students in this new format.	16	9 (56.25)	5 (31.25)	0 (0)	1 (6.25)	0 (0)	1 (6.25)
I would be open to interacting with student pharmacists virtually in the future.	16	10 (62.5)	4 (25)	2 (12.5)	0 (0)	0 (0)	
I found my level of engagement was consistent as with what I experience during face-to-face encounters.	14	5 (35.7)	8 (57.2)	0 (0)	1 (7.1)	0 (0)	
I found acting in this environment enjoyable.	16	9 (56.3)	3 (18.8)	(6.3)	0 (0)	0 (0)	3 (18.8)
I found the duration of time dedicated to acting in a station to be manageable.	16	8 (50)	6 (37.5)	0 (0)	0 (0)	0 (0)	2 (12.5)
I appreciated not having to grade the encounter when I was acting in the encounter.	12	10 (83.3)	2 (16.7)	0 (0)	0 (0)	0 (0)	
I found the duration of time dedicated to grading in a station to be manageable.	14	5 (35.7)	6 (42.9)	2 (14.3)	1 (7.1)	0 (0)	
I appreciated having the ability to rewatch stations during the grading process.	12	11 (91.7)	1 (8.3)	0 (0)	0 (0)	0 (0)	

PBAs introduced a unique challenge considering that there were several groups of individuals involved (students, SPs, and faculty/staff), space/facility concerns with smaller exam rooms, and equipment concerns. Solutions to these concerns included the simulation of telehealth environments along with face-to-face interactions, alternative assessment schedules to allow for proper cleaning and sanitization, and the utilization of alternative testing environments to optimize physical distancing standards.

To have a formal mechanism for screening students for symptoms of COVID-19, Auburn University adopted Guidesafe™Healthcheck (The University of Alabama at Birmingham, 2020), a web-based screening tool to easily identify students who are cleared to report to campus. Prior to each PBA event held on campus, students were required to show their 'green screen' indicating they were cleared for presence on campus. Student temperatures were also checked using an infrared thermometer upon entry into the testing environment. Any student with a temperature above 100 °F, a 'red screen' on the Healthcheck tool, or a recent close contact with a COVID-19 positive person was sent home and their assessment rescheduled. All students, SPs, and employees were required to wear a face mask and maintain 6-foot separation from others while on campus per university policy.

While skills lab coordinators at AUHSOP attempted to utilize traditional PBA formats whenever possible, COVID-19 preventive strategies led to scheduling no more than two stations to be completed back-to-back. Students also completed the stations sequentially (each student completed the same station at once and then all progressed to the next station) instead of students rotating stations in a round robin approach. This allowed time for cleaning and sanitizing exam rooms between each student. Concerns with the number of individuals in the PBA exam room area led to continued use of Zoom for some station interactions; however, all SPs and students were present on campus to provide easier access to support if technical difficulties arose. Students and SPs could remove face masks while interacting on Zoom since they were alone in separate closed rooms. When SPs were in an exam room with a student to complete the interaction, mask wearing and physical distancing was enforced, and station time was limited to 10 minutes to minimize exposure time. For most cases when SPs graded case content material with an analytical checklist, separate SPs were hired to grade the recordings from home a day or two after the event instead of grading in real-time. Most of the assessment instruments remained identical to previous years despite the logistical changes required. Specific alterations in case design and evaluation are provided for each professional year.

Professional Year 1

Three separate PBA events were held in the fall semester for PY1 students contributing the assessment plan for the ILE 1, ILE 2, and Longitudinal 1 courses. While some modifications were made in delivery of the cases, no station content was removed compared to previous course offerings. Since PBAs are a new form of assessment for most student pharmacists, an orientation is held during the first few weeks of school. This orientation was restructured so that students could experience a mock PBA in a simulated telehealth environment. Students interacted with a partner via Zoom and evaluated their interview skills using a brief checklist and modified communication rubric followed by a facilitated discussion of future PBA interactions with SPs.

The first PBA administered during the fall semester is always the ILE 1 midpoint PBA, designed as a lower-stakes assessment to introduce PY1 students to PBA station formats. This PBA event included three unique stations administered at two different times over the course of one day. Different approaches were used for each case based upon specific student demonstration and assessment needs. One station was a non-interactive hypertension case in which students provided written answers to a series of questions related to patient case information. Other than ensuring 6-foot separation between students and allowing time for cleaning after each student round, this station was run identical to previous years except that a paper case was provided instead of accessing an EHR, which was being phased out of the curriculum in preparation for different health record software. The two interactive scenarios were scheduled for students separately from the non-interactive scenario. For the blood pressure station, the SP was in the room with the student to act and grade; however, student demonstration criteria were altered so that the student did not have to touch the patient and demonstrated everything on a blood pressure simulator arm. This resulted in the removal of six items from the analytical checklist for the station related to correct cuff placement on a patient. While this change in assessment strategy is not ideal, the main focus on this assessment was blood pressure accuracy which was maintained with the use of a simulator arm. Alternately, the diabetes patient history station had SPs connected via Zoom and recordings graded later by another SP.

As the semester continued, the format for PBA stations remained consistent with some minor alterations based upon previous experiences. The ILE 1 final PBA, which was conducted only 2 weeks after the midpoint PBA, included three unique interactive stations administered at two different times over two days. Due to the proximity to the previous PBA, most stations were planned in a similar format. A glucose meter counseling station had the SP in the room with the student to both act and grade their performance and was completed separately from the other two stations. For the obesity education station, students interacted with the SP via Zoom and station recordings were graded later by another SP. One difference occurred with a station focused on interviewing a patient with constipation. For this station, the SP was in the room with the student and another SP was watching remotely and grading in real time. This is similar to pre-pandemic PBA station grading, although the SPs did not switch roles throughout the day and remained either as an actor or a grader.

The biggest challenge from a scheduling perspective was the ILE 2/Longitudinal 1 PBA conducted at the end of the semester in November. This PBA event included six unique stations administered at three different times over three days. Turn-around time for grades was shortened since it was the end of the semester, so real-time grading was implemented for half of the stations, either by the SP serving as the actor or an alternate SP. Whenever two interactive cases were completed together, one case presented the SP in the room with the student while the other had the SP connected via Zoom. A summary of the cases is provided in Table 3.

Table 3. Summary of stations included on ILE 2/Longitudinal 1 PBA in fall 2020

	Station Focus	SP Interaction Methodology	Grading Timeline
PBA Event #1	Needs assessment interviewing	Zoom interaction	Recordings graded by SP
	New prescription counseling	Face-to-face interaction	Recordings graded by SP
PBA Event #2	Depression screening	Zoom interaction	SP acted and graded student in real time
	Hypothyroid patient case	Non-interactive paper case	Case answers graded by faculty
PBA Event #3	Inhaler counseling	Face-to-face interaction	Graded in real-time by another SP
	OTC smoking cessation product counseling	Zoom interaction	Graded in real-time by another SP

Professional Year 2

The COVID-19 pandemic and other curricular factors posed significant adaptation challenges for the PY2 class. The ILE 5 PBAs consisted of three different periods of assessment and a total of four stations (blood pressure skill demonstration, blood glucose meter counseling, non-sterile compounding, and counseling on inhaler technique). One major decision when planning the ILE 5 PBA was whether the skills demonstrations could be completed face-to-face with SPs or as described previously for PY3 students. Because PY2 students were to participate in a one-week health and wellness experiential clerkship mid-semester, it was critical to ensure competency in manual blood pressure measurement and glucose meter counseling prior to this experience. Therefore, it was decided to conduct these two skills assessments in-person with SPs. Students were instructed to interact with the SP regarding their health history and any factors that would affect their measurements, conduct the appropriate test for their assessment, and report the results to the SP. At the conclusion of the interaction, SPs evaluated the student's performance on both an analytical checklist and a communication rubric, similar to previous years.

The non-sterile compounding station was a new component of ILE 5, as the incoming PY2 class was unable to complete compounding labs or assessments during PY1 due to remote delivery in the spring semester. Even though the skills activities and assessments moved to fall PY2, they were conducted similarly to previous years. Students were given 15 minutes to compound a suspension and complete a worksheet related to the preparation. While students did not print out a prescription label for their product as in previous years, they were held responsible for providing information they would include on a label.

The final station required students to provide inhaler device counseling to an SP via Zoom. Conducting this station via Zoom posed some challenges because one of the main components of the station was the ability of the student to identify an error in inhaler technique from the SP and provide a correction. This was one of the first experiences where the SPs had to navigate Zoom from an on-campus team room, leading to several instances of the SP either not turning on their camera, or not engaging with the student promptly.

Transitioning to ILE 6, the intent was to continue some of the modalities implemented in ILE 5 while improving upon areas as needed. The ILE 6 PBAs consisted of two non-interactive and three interactive scenarios for a total of five stations completed over three separate assessment times. The first interactive station tasked students with counseling a patient on a new prescription for an insulin pen. A face-to-face interaction was planned for this station because there are several aspects of counseling that required direct observation from the SP to evaluate, such as dialing the correct dose on the insulin pen and inspecting for a drop of insulin to appear when priming the device. This station was completed on its own, which allowed for a quick assessment period while still allowing sufficient time to clean the exam rooms.

The next assessment time included two distinct parts, a non-interactive case on lipid management followed by an interaction with a patient. For the non-interactive case, students reviewed a patient chart and answered questions, guiding the student to develop an assessment and plan for the patient. After completing this component, students proceeded to complete an SP interaction in which they counseled a patient on the new medication selected during the non-interactive component. A separate lab space was used for the non-interactive station which allowed for the maximum number of students to complete the station at one time.

The final component of the ILE 6 PBAs included a non-interactive sterile compounding station and an interactive renal counseling station. The non-sterile compounding station was able to be completed similarly to previous years, with the student completing a calculation for a medication order and then completing the sterile compounding for that order. This station is graded by a faculty member in real-time while maintaining appropriate physical distance. Following this station, students proceeded to the renal counseling station. In order to maximize scheduling and to utilize all available space, the renal counseling station occurred in an alternative testing environment on campus. The rooms were arranged with a conference table in the middle, allowing the student and SP to sit across from each other while maintaining physical distance. Utilizing this space posed several challenges, including timing and communication. The student team rooms are located one floor above the skills lab. Time for transit between the stations was not factored into the schedule, which caused the sterile compounding station to proceed while the renal counseling station was still in progress. Additionally, most students completed the sterile compounding within 4-6 minutes while the station was allotted 8 minutes to complete. Communication between the two testing environments was limited which led to several student groups completing the sterile compounding component without being able to progress to the renal counseling station. Another challenge was space for the SPs in the alternate testing space. The hallway where the exams were conducted had limited access to rooms that would allow the SPs to not only wait for students to arrive, but to also complete their communication evaluation after the interaction. Ultimately, these issues were resolved, but the unfamiliarity of using this testing environment during PBAs increased the challenges that are already present with conducting PBAs in general.

Professional Year 3

The fall of 2020 was the second iteration of the PY3 ILE 9 and ILE 10 and like PY2, the assessments required adjustments from a course design standpoint and accommodations for COVID-19 limitations. For ILE 9, the PBA included assessments related to diabetes counseling and sterile compounding. For the diabetes scenario, the station was pivoted to a telemedicine interaction with an SP in which students addressed patient concerns regarding a newly started medication regimen for diabetes mellitus. For sterile compounding, the station was held in a similar fashion as in previous years with real-time grading by a pharmacist. The main accommodations for this station included setting up the skills lab with more room in between testing stations and more time scheduled between students to allow for cleaning. Additionally, this PBA was held on a different day prior to the assessment week.

For ILE 10, students completed a written assessment and plan for a patient case submitted via the LMS followed by an interactive station in which they answered questions about concepts related to the case. To accommodate COVID-19 restrictions, students were spread between two large auditoriums to allow for physical distancing for the non-interactive case. Extra proctors were needed for proctoring the rooms and for escorting students between the classroom and skills lab for the interactive portion of the PBA. Students were kept distanced while traveling between testing locations and while waiting outside of the interaction testing space. For the interactive portion of the case, a faculty member connected with the student via Zoom to decrease potential contact and to allow off-site faculty to participate in the process. In the previous iteration of this ILE, SPs served as APPE preceptors; however, pharmacist faculty members served as actors and graders for this station in fall 2020. Since this case is based on clinical information delivery, SPs struggled with realistically adapting to student responses during the case administration due to their lack of clinical knowledge. This change was made so that faculty could realistically interact with the students in a simulated APPE environment while also improving grading consistency.

Issues, Controversies, Problems

Student Factors

While Millennials and Generation Z populations are considered technologically savvy (Black, 2010; Ford & Moseley, 2020; Shatto & Erwin, 2016; Shatto & Erwin, 2017), COVID-19 showed that while students may be familiar with technology, this acumen is greatly limited. The transition from in-person assessments to web-based assessments posed several challenges for student pharmacists as the AUHSOP adapted end of semester assessments to ensure students were able to complete their coursework. To minimize technical complications with PBAs, it was decided to use technology systems students were already using within their coursework. This ensured that students would have utilized these processes prior to high-stakes assessments and would be able to navigate potential issues should they arise during the examination. Related to technology systems, the biggest issue for students was their unfamiliarity with using a VPN to access drug information resources from off campus and following the necessary sequential process required to engage technology.

Honorlock, an online exam proctoring service, was the only new system introduced after the switch to remote delivery of assessments; however, it was used for both written assessments and PBAs. To ease this transition, all students were required to participate in an hour-long interactive webinar lead by the Director of Assessment which introduced Honorlock and provided students with utilization strategies. Lastly, students were encouraged to complete a practice quiz prior to using the new technology for higher-stakes assessments. When students began an assessment, Honorlock prompted them to provide a 360-degree scan of their room to ensure they were completing the assessment in a secure, private environment. Throughout the assessment Honorlock limits student to accessing pre-specified websites, monitors students through the use of AI and live proctors, and records the student. Honorlock was predominantly used for non-interactive PBA stations in spring 2020, although similar concepts of a 360-degree room scan and recording encounters were implemented with the interactive stations on Zoom. Because of student privacy concerns and assessment integrity, AUHSOP decided to prioritize on-campus delivery of all assessments when a hybrid delivery format was instituted in fall 2020.

One of the most significant challenges that students encountered was internet access. Students were challenged either by insufficient bandwidth or a general lack of access within their homes. As some students elected to remain in their housing close to campus, the lack of access to campus buildings and public internet access points also limited their ability to identify alternate locations that would generally offer better internet connectivity. Others noted that while they had sufficient internet access for the encounter, they lacked the knowledge to navigate the multiple technology systems needed to complete their encounters. Students were also not prepared for the level of adaptability needed to navigate between the systems. Detailed instructions and leniency when connectivity issues arose was paramount in ensuring successful completion of PBAs. With the ability to conduct assessment in-person in the fall semester, the internet connectivity issues for students were minimized; however, assessment integrity remained an issue because of the extended time it took to complete all the assessments under the new COVID-19 precautions.

Because many students unexpectedly remained at home following spring break, they did not have access to supplies, such as a blood pressure cuff and stethoscope, required to complete many of the PBA stations. Students are also required to wear professional attire and a white lab coat when interacting with SPs on a PBA; however, many did not bring these items home with them for spring break. As a result, assessments were redesigned, and leniency was granted for professional attire which led to an uneven level of professionalism with some students when completing their PBA stations at home. SPs reported students in inappropriate testing locations (lounging on their bed, laying down in a reclined position) and inappropriate attire (wearing baseball caps, hooded sweatshirts).

While student absences for illness are not new in the pandemic setting, the requirement of quarantine periods for exposures or positive cases posed different challenges for make-up PBAs. Because students were completely virtual for spring 2020, make-up requirements were less challenging as students were able to complete the assessments from any location if they had access to a computer and stable internet. For the fall 2020, all assessments were completed on campus, but students were not allowed on campus unless they were cleared from isolation or quarantine. Factors such as varying exposure dates, date of positive test, and ability to return to campus based on symptom resolution led to the potential for varying dates of return to campus. Therefore, it was not feasible for coordinators to pre-determine make-up times. One strategy was to schedule a make-up at the end of another assessment period with an SP who had acted in the previous case and knew the case material. Additionally, some cases required modification of content to ensure the rigor and integrity of the case. Regardless of the need for make-ups, grade release and assessment review were not delayed for the remainder of the class.

Assessment scheduling was another challenge to address once students returned to in-person PBAs in the fall. Instead of completing four to six stations at a time, only one or two stations could be scheduled sequentially to allow time for cleaning between each student. This resulted in numerous schedules for students to keep track of during a busy assessment week. Anecdotally, students preferred this assessment format because they could focus their studying on the stations completed that day instead of studying for all stations at once. While this seemed to be preferred from a student perspective, it is not a realistic comparison to clinical practice environments.

SP Factors

Prior to COVID-19, all students and SPs participated in PBAs within AUHSOP buildings, allowing individuals to be supported by information technology specialists and PBA coordinators. Therefore, SPs had limited experience independently navigating within the various technology systems used during these high-stakes assessments. To determine how comfortable SPs were with this new assessment environment, a brief survey was distributed prior to the remote assessment period. Using a Likert scale, SPs were tasked with indicating their level of comfort with each technology system involved in PBAs, including willingness to download the software needed to meet virtually onto a personal device, acting as a patient via the web-based encounter, and serving as a grader during or following the web-based encounter. Any SP indicating discomfort with this new format was not utilized for the spring 2020 PBAs. In preparation for the multiple weeks of assessments and to ensure that all SPs were able navigate the web-based meeting software prior to the scheduled case training, a detailed email was sent outlining the steps and procedures for downloading and installing Zoom onto their personal devices. SPs were then asked to participate in a quick virtual meeting to demonstrate their ability to connect to a call and to address any logistical questions or concerns. The integration of a 'test' meeting allowed the scheduled actor training to be focused on case content and prevented training delays due to technology challenges.

The transition to web-based PBAs also resulted in new testing environment challenges related to the actual administration of the exam and overall test security. To address concerns related to academic honesty, the SPs serving as the 'patient' or 'physician' for the interaction were also tasked with serving as testing proctors. SPs were responsible for ensuring that students did not have notes or related materials within their testing space by requesting that each student scan their testing environment, including the surrounding room and desk. Students were also required to share their computer screens via Zoom to ensure that notes or other potential testing resources were not accessible on their device. The additional time required for this component of testing was factored into the time allotted for each student interaction.

Prior to the pandemic, training of SPs for each PBA event was two-fold and included case training for both acting and grading up to a week prior to the event and debriefing with a faculty member after the first several rounds during the event. After transitioning to remote PBA delivery, all SP case training was conducted via Zoom with each SP calling in from home. Due to continued physical distancing recommendations, training via Zoom continued in the fall semester even though SPs came to campus to act for each of the stations. Because it helped streamline the training process and SPs responded positively, Zoom training sessions will likely continue even after pandemic-related restrictions are lifted. Another shift in SP training was necessary during the PBA event days. Typically, debriefing time was set aside after the first few students to provide feedback on both acting and grading tasks; however, there was not adequate time in the schedule to allow for this with the alternative scheduling format. No debriefing was provided during the full remote delivery; however, debriefing was conducted in a less formal manner once the SPs returned to campus. Instead of having a dedicated time for debriefing, faculty would talk with SPs after they had watched several rounds of students to provide them feedback on their performance and suggest modifications to the script. While pre-pandemic most cases were graded in real-time by the SPs, during the pandemic many of the case recordings were graded after the encounters were completed. This allowed the SP graders to work at their own pace and re-watch portions of the case if needed for improved grading reliability and student feedback; however, it eliminated the real-time coaching that often occurred between the SPs acting and grading the case.

Logistic Factors

The Director of Assessment worked closely with the Information Technology PBA liaison prior to and during each round of PBAs to strategize and address technology concerns that could impact students and SPs as they navigated the testing experience. While many of the programs used were not new, students, faculty, and SPs were using them in different ways. Each round of PBAs contained differing elements that required the incorporation of multiple types of technology including Canvas, Honorlock, ExamSoft (ExamSoft Worldwide, Inc, 2021), and Zoom. AUHSOP had not utilized Honorlock within their assessment framework prior to COVID-19. However, with the transition to online testing, the Director of the Professional Program identified an increased need for web-based proctoring to ensure testing security. Instructions for navigating Honorlock were documented within each Canvas course page for ongoing student referencing. For consistency, the PBA development team utilized Honorlock for any performance-based assessment that did not require a patient or provider interaction during the spring semester as described previously.

For several years, AUHSOP integrated a web-based assessment platform, ExamSoft, as the mechanism for delivering assessments within the Doctor of Pharmacy curriculum. While several health professions programs have integrated online platforms for traditional assessment approaches such as quizzes and examinations, AUHSOP expanded the utilization with classroom and clinical skills assessments evaluated using the rubrics feature. This integration allowed the PBA development team to provide meaningful and intentional feedback on performance-based assessments and allowed faculty and students to assess the student's progression within the curriculum's core competencies, disease states, and foundational knowledge at the conclusion of every assessment. Because all students, SPs, and faculty were already utilizing ExamSoft prior to the pandemic, the transition to remote grading was met with little resistance. While allowing SPs to grade remotely after the PBA station was completed did allow them to re-watch stations as needed, it necessitated recordings for each station to be available and delayed finalization of grades for the students. As previously mentioned, SPs also were unable to benefit from real-time feedback from their grading partner. The implementation of iPads for SP grading has also been beneficial as it eliminated additional steps to the grading process and potentially reduced errors related to data entry. Prior to COVID-19, AUHSOP had implemented a slow rollout of iPad utilization for communication rubric grading to help prepare SPs for the full-implementation originally slated for spring 2020.

As a component of the curriculum, PBA reviews have been offered as a way for students to examine their performance and reflect on areas for improvement. Prior to the pandemic, reviews were held in two separate sessions, required reviews for students scoring <70% on any station and open reviews for all other students. The required review session was further separated by each individual case. This afforded students the opportunity to review the details of the case rubrics and, through self-evaluation, better understand what went well during the PBA and what areas require improvement. Faculty also addressed common mistakes made by students completing the required review. This review format ensures assessment integrity and allows for re-use of cases in subsequent years since detailed checklists are only provided under faculty supervision. Review sessions were reformatted during the spring semester to allow for remote delivery with a primary objective of sharing the global concepts of the case without providing specific checklist grading content. Skills lab coordinators planned to lead a discussion of the case without student questions; however, students became frustrated when they were unable to determine specific items on the checklist that were missed. As a result, in at least one instance specific case material was revealed to students and therefore could no longer be used in future years. Since both the students and coordinators were dissatisfied with PBA review sessions on Zoom, students returned to campus in the fall semester for all reviews. To accommodate COVID-19 restrictions, extra measures were put in place including student screening, distancing in the physical space, and adjustments for students completing required reviews. To effectively implement physical distancing recommendations, coordinators assigned groups of students a specific time for their review, regardless of requirement for review.

Other low-tech factors contributed to some of the challenges with administering the PBAs in a hybrid format once students and SPs were back on campus. From a personnel standpoint, AUHSOP was without a Director of Assessment during the fall semester while a search was being conducted to fill the vacant position. This left most of the coordination and management of the PBAs to the three skills lab coordinators at a time when more oversight would have been helpful. Additionally, scheduling and cleaning protocols needed to be developed with little assistance from administration. Sanitation protocols included cleaning each exam room (including any surfaces that may have been touched) in between each student. This led to an alternate schedule than previous years in which students completed one station at a time instead of rotating between several stations and allowed for unoccupied rooms between each student to allow for cleaning by either SPs or the PBA administration team.

SOLUTIONS AND RECOMMENDATIONS

While some modifications were required to meet COVID-19 recommendations, the overall PBA assessment goals were maintained throughout the pandemic. An evaluation of overall student performance on PBAs for each ILE demonstrated no difference in student performance. Additionally, the intended competencies for each assessment remained the same throughout the pandemic, with minimal changes made to grading criteria. Moving forward to future PBA events at AUHSOP, the authors will continue to address the factors listed above, striving to move toward a more traditional PBA format, while incorporating positive aspects of changes made during the pandemic. Specific areas of focus include the ability to schedule multiple stations in sequence for each event, continuation of alternative station formats, and flexibility with grading interactive stations.

As described, the overall implementation of PBA assessments throughout the pandemic no longer fit the traditional format of PBAs as students completed individual stations over a series of days instead of a series of stations at one time. While student feedback has been positive about this logistical change, the overall intent of the assessment has been diminished. These assessments no longer mimic the clinical environment where students see multiple patients while managing multiple complex problems. Faculty have expressed concerns regarding students' abilities to navigate a true clinical environment as they are not used to the pace and rigor required for caring for multiple patients at once. To resolve these concerns, the faculty intend to resume the previous assessment schedule to include multiple sequential stations once COVID-19 restrictions are lifted.

Telehealth communication with patients will likely continue post-pandemic, therefore it will be important to continue to teach and assess student communication skills in this healthcare environment. In addition to telehealth scenarios, the authors anticipate continuation of other alternative station delivery methods resulting from pandemic restrictions. Instructional recordings of clinical skills will be incorporated into the PY3 assessment plan to streamline skills check-off assessments and encourage student creativity. Also, use of Canvas as a document repository and secure method of case information delivery to students will continue post-pandemic.

Prior to COVID-19, most interactive stations were graded in real-time by two separate SPs. The SP interacting with the student focused on grading communication skills while a second SP watched a live feed of the interaction to grade station content. This allowed for rapid turn-around time in releasing grades to students. With COVID-19 restrictions in place, it was necessary to remotely grade most interactive station recordings following the conclusion of the PBA event. This led to a delay in grade release and prolonged grading periods compared to real-time grading. An advantage to grading station recordings is the ability to pause, rewind, and re-watch station content, resulting in more accurate grades; however, it is unclear how many SPs took advantage of this opportunity. Another challenge has been the lack of feedback provided by the graders. With the removal of real-time grading, an increased level of feedback was expected since SPs were no longer limited in the amount of time available for adding feedback comments before grading the next student; however, this was not always the case when SPs graded station recordings remotely after the assessment day. Lastly, the loss of the Director of Assessment in fall 2020 eliminated the additional support needed to manage the verification process for ensuring all grading had been completed and to address assessment-related questions and concerns as an SP liaison. A new Director of Assessment was hired in spring 2021, but the extent of their ongoing involvement in PBAs has yet to be determined. Further investigation into grading practices is needed before long-term plans are made; however, it is reasonable that remote grading will continue in some capacity.

Other logistic changes made will likely continue post-pandemic to improve student preparation for and reflection on PBAs. Provision of additional logistic information to students in advance appears to have reduced student anxiety regarding the assessments. Previously, students were only aware of the station focus and objectives; however, in response to varied delivery modalities, station timing, and multiple schedules, students were provided with additional PBA logistics information beforehand, including the station duration, mode of delivery, and any resources available. Though not directly related to pandemic restrictions, PBA reviews were altered to encourage more reflection on PBA performance. Students who were required to attend the review were provided with a worksheet for self-reflection. The objective of this worksheet is to encourage students to constantly review their performance and to develop habits to improve in deficient areas. For stations graded exclusively by SPs, students have always been able to request a faculty regrade of the station based upon the recorded content; however, regrade request forms were implemented to encourage students to reflect upon their performance and provide rationale for the regrade request. The required review and regrade request forms were piloted with PY1 and PY2 students in the fall with plans for full implementation across all years in future semesters.

FUTURE RESEARCH DIRECTIONS

As we move closer to the post-pandemic world and public health recommendations change, modifications to PBAs will continue and require evaluation for multiple outcomes. Evaluating overall student performance before, during, and after the pandemic period will be important for ongoing curricular assessment. The authors anticipate evaluating several different aspects of PBA delivery and performance from student and operational perspectives. While evaluation of student performance on PBAs is a component of the overall assessment plan for the PRC, the authors plan to incorporate more comparisons of student performance based on varied factors. An example includes evaluating student performance on PBAs performed sequentially compared to multiple events over several days. Other aspects the authors plan to study include the impact of telehealth scenarios compared to face-to-face interactions, development of communication skills in the virtual environment, and long-term assessment of competencies. Operationally, the authors would like to investigate accuracy in grading when completed from viewing recordings versus live grading. While in theory remote grading from recordings should be more accurate and thorough, the authors have seen some discrepancies and data is needed to support future considerations in grading. Another factor to consider is resource utilization effects of the pandemic, since remote graders were used extensively, and differing numbers of SPs were required for a variety of functions. It is unknown if the scheduling and grading changes implemented because of the pandemic ultimately led to cost savings or additional expenditures.

CONCLUSION

The COVID-19 pandemic has affected planning and delivery of performance-based assessments across all health professions programs. This chapter provided one such program's response to the challenge of continuing robust assessments of clinical skills performance in fully remote and hybrid environments. While the examples provided were focused on pharmacist skills and abilities, the concepts can be applied to any health professions program. Future iterations of performance-based assessments will benefit from the lessons learned throughout this pandemic.

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KEY TERMS AND DEFINITIONS

Integrated Learning Experience (ILE): A six-week course included in Auburn University Harrison School of Pharmacy's Practice Ready Curriculum. Each course is mapped to competencies and disease states and integrates all aspects of pharmacy, including pharmacology, medicinal chemistry, pathophysiology, clinical therapeutics, and patient care topics. There are a total of twelve ILE courses throughout the first three years of the Practice Ready Curriculum.

Interactive Scenario: A performance-based assessment station that requires the student to engage with a standardized person to complete the assigned task.

Longitudinal Course: A semester-long course included in Auburn University Harrison School of Pharmacy's Practice Ready Curriculum with a designated healthcare theme such as the US healthcare system, communication skills, health and wellness, pharmacy management principles, and innovative pharmacy practices. There are a total of six longitudinal courses throughout the first three years of the Practice Ready Curriculum.

Non-Interactive Scenario: A performance-based assessment station that does not require the student to engage with a standardized person to complete the task. This scenario can include review of patient medical information, completion of a worksheet or other documentation, or demonstration of competence in sterile or non-sterile compounding.

Objective Structured Clinical Examination (OSCE): A form of performance-based assessment used to measure clinical competence. Introduced initially as an assessment method in medical education, an OSCE is a series of stations designed to evaluate clinical skills correlated to various disease states, often interacting with standardized persons in a variety of healthcare settings.

Performance-Based Assessment (PBA): An assessment or group of assessments that evaluates learners on their ability to complete a clinical skill or series of skills, interact with a standardized person, or demonstrate technical skills (e.g., sterile and non-sterile compounding). The assessment may include one or more interactive or non-interactive scenarios.

Professional Year (PY): One of four academic years included in the Doctor of Pharmacy professional program at Auburn University Harrison School of Pharmacy. The professional program begins after all pre-professional coursework is completed and the student is enrolled in the Doctor of Pharmacy program.

Practice Ready Curriculum (PRC): The competency-based Doctor of Pharmacy professional program at Auburn University Harrison School of Pharmacy designed to integrate foundational knowledge, clinical sciences, behavioral sciences, and other topics vital to success as a pharmacist.

Standardized Person (SP): A faculty member or other individual hired to play the role of a patient, caregiver, or healthcare provider within a structured scenario. SPs may also serve in a grading capacity utilizing a provided checklist or rubric to evaluate student performance.

Zoom: A videoconferencing platform with the capacity for screen sharing and recording used to remotely connect with students, standardized persons, and other personnel during performance-based assessments.

Chapter 8
Nursing Education Innovations and Obstacles During COVID-19:
Lessons Learned and How That Information Will Be Used Post-Pandemic

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ABSTRACT

The COVID-19 pandemic created a paradigm shift in the way educators employ active learning strategies. In this chapter, the authors discuss how engaging and innovative learning strategies were developed to teach baccalaureate-level nursing students during the COVID-19 pandemic. The initial focus is on the teaching and learning strategies created for first-semester students who are developing foundational nursing skills and concepts. The discussion transitions to complex strategies developed for fourth-semester students, solidifying critical thinking and clinical judgment skills. Highlighted are active learning strategies used in the classroom, skills lab, and simulated clinical environment. These promote clinical judgment and present practical direction for adapting technology to provide an engaging learning environment. Throughout the chapter, the authors use several strategies to showcase how a nursing program responded to COVID-19 restrictions, including active learning and technology strategies, and how they can be applied across a curriculum using varying levels of technology.

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INTRODUCTION

The COVID-19 pandemic changed the face of education globally, and particularly nursing education. In March 2020, the first confirmed cases in the United States of the novel coronavirus forced most educational institutions to change their practices. Many nursing programs were required to remove students from all in-person clinical and classroom activities, and conduct the remainder of the academic semester remotely. Faculty were challenged with providing meaningful and innovative classroom and clinical activities to meet course outcomes. This chapter will discuss instructional strategies developed in response to the COVID-19 restrictions, some of which merit continuance after the ease of pandemic restrictions. This chapter also explores how educators can 1) engage learners inside the classroom using non-traditional methods, 2) develop learners' clinical skills outside of the traditional lab space, and 3) maintain safety while keeping students and faculty engaged during simulation.

BACKGROUND

Before the pandemic, innovative learning strategies, such as simulation in the classroom and virtual reality, began gaining popularity in baccalaureate nursing programs (Aebersold, 2018). However, the mainstay of many programs remained traditional hands-on learning conducted in a face-to-face format. This format is particularly adept at teaching psychomotor skills, which are vital to success in professional practice roles such as nursing (Tabatabai, 2020; Van Horne & Murniati, 2016; Tharayil et. al., 2018). As face-to-face instruction was interrupted due to the COVID-19 pandemic, innovative learning strategies were thrust into the curricula. Many nursing programs quickly implemented screen-based or virtual learning strategies in the classroom, skills, and simulation labs. Hodges et al. (2020) referred to this initial transition to the online learning environment as emergency remote teaching, described as a temporary shift from one educational delivery mode to another due to an immediate crisis.

During emergency remote teaching, courses that were intended to be delivered face-to-face were delivered in an alternate format, but without the typical planning or development time that goes into online learning delivery (Hodges et al., 2020). Also, according to Hodges et al. (2020), the typical planning and development time for a fully online course is six to nine months before course delivery. During the COVID-19 crisis, lead times for nursing programs to transition from face-to-face to remote delivery ranged from one day to a few weeks. Many faculty and students experienced a need for additional education and support for technology; however, the systems that provide those resources were severely stressed due to the scale of need across campus. In turn, faculty were required to rely on accrediting and other leading nursing organizations and publications for guidance on best practices and strategies for transitioning to online learning (Mariani et al., 2020).

A primary concern for nursing educators was how to effectively harness technology and adapt instruction to effectively teach clinical judgment to their students. In healthcare, clinical judgment is the ability to respond to patient cues with appropriate clinical decisions and is regarded as an essential skill for safe and effective nursing practice (Victor-Chmil, 2013). Preparing students to exercise sound clinical judgment begins in the first semester of their nursing program with the development of critical thinking and clinical reasoning. Critical thinking is the intentional, logical thought process intended to respond to and improve patient outcomes (Papathanasiou et. al., 2014). Essentially, critical thinking is knowledge-based. Clinical reasoning is the application of critical thinking to a clinical situation (Pa-

pathanasious et. al., 2014). As students progress through a nursing program, they must be challenged to develop a strong knowledge base (i.e., critical thinking) so they can assess a rapidly evolving situation (i.e., clinical reasoning) and generate the best possible evidence-based solution (i.e., clinical judgment) (See Figure 1 and Callout Box 1 in the Appendix). At the senior level, the goal is to provide a curriculum that solidifies clinical reasoning and clinical judgment skills for students who are preparing to enter the nursing workforce.

A variety of strategies can be used to achieve this goal, including active learning strategies, skills practice labs, and simulation-based experiences (SBEs). However, many faculty largely relied on face-to-face delivery of these strategies before the pandemic. Faculty were challenged to identify and develop new or revise existing active learning strategies to bridge the gap of hands-on learning in an online environment. The purpose of this chapter is to share how the faculty and staff from a baccalaureate nursing program approached the challenge of COVID-19 by developing screen-based learning strategies for the classroom, skills lab, and simulation-based experiences. The newly developed strategies were designed to promote clinical judgment skills in students ranging from novice to advanced, and will continue to be beneficial after COVID-19 restrictions are lifted. These strategies can be applied by other nursing programs using varying degrees of technology.

TEACHING DURING A PANDEMIC

Issues, Controversies, Problems

Active Learning Strategies: Enhancing Student Learning and Facilitating Clinical Judgment in the Classroom before the Pandemic

The first semester of the nursing program sets the stage for the development of foundational nursing skills and concepts. The curriculum is designed to introduce critical thinking and clinical reasoning to students who are preparing to care for patients for the first time. Strategies such as skills lab practice and SBEs can be used to build upon theoretical course content and develop clinical reasoning and clinical judgment skills. For example, novice students in the first semester of a baccalaureate program attended class in the traditional lecture hall after completing assigned pre-work that included readings, short, recorded lectures, and skills instruction videos. During class, faculty addressed theoretical topics such as the role of the nurse, and assessment of body systems and vital signs. Faculty facilitated discussion based on the pre-assigned work and clarified questions surrounding theoretical concepts.

Students then attended a corresponding skills lab to practice the psychomotor skills associated with the theoretical content. They were provided with multiple opportunities to practice hands-on skills and receive guidance and feedback from faculty. This process of repetition and guided, constructive feedback is the hallmark of the Deliberate Practice Theory (Ericsson et al., 1993). The Deliberate Practice Theory suggests that students can dramatically improve their psychomotor skills if practice time on the desired skill is provided and used in deliberate ways. Practice needs to be contextual, focused, and include constructive feedback by content experts. During the practice of nursing psychomotor skills, students can move beyond simply correcting errors by instructors emphasizing the ‘why’ that drives their suggestions to help students gain a thorough understanding and make progress towards proficiency. Any gaps in conceptual knowledge that were identified through psychomotor skills practice were communicated to the course instructor and addressed in the classroom. As novice students gained proficiency in critical thinking, they were further challenged to apply their knowledge to a simple scenario or case study to promote clinical reasoning skills.

The progression of learning from conceptual to practical is carried across the curriculum and students are increasingly challenged at higher levels of thinking as they advance through the program. Instruction designed to enhance clinical judgment shifts from the traditional lecture or classroom-based learning to formats that encourage students to apply clinical judgment skills. Before the pandemic, faculty teaching advanced-level students developed new instructional activities such as flipped classrooms, unfolding cases, branching scenarios, and gaming to facilitate learning course content while simultaneously developing clinical judgment.

In flipped classroom learning, students were assigned pre-work to complete outside of class time. Pre-work consisted of any or a combination of assigned readings, clinical skills videos, pre-recorded content videos, care plans, etc. Scheduled class time was focused on applying knowledge gained from the pre-work to case studies presented in the classroom. Students practiced critical thinking and clinical judgment skills as they worked through the case studies. Direct feedback and guidance from the faculty were used to reinforce or redirect their learning.

Unfolding case studies are short, written scenarios in which the case evolves in a way that is unpredictable for the learner (Bowman, 2017). These types of case studies start as a simple concept or patient condition and increase in complexity. Patients may improve or decline depending on the actions chosen by students. The unfolding cases and scenarios were structured using true-to-life cases representative of the content being covered. Small student groups worked together to make complex decisions based on cues built into the case studies. The instructor facilitated the cases by asking probing questions that spurred student thought processes. Each case study was designed to guide student clinical judgment. For care to be deemed appropriate, the students were required to recognize cues relevant to the case, such as physical assessment findings, lab tests, or radiologic studies. Then, students had to analyze the cues to develop and prioritize their nursing interventions. To further enhance student learning and engagement, unfolding case studies were brought to life by human patient simulators—life-like manikins that mimic a patient's physiological responses—situated at the front of the classroom. (See Figure 2a, 2b, and Callout Box 2 in the Appendix).

Game-based learning was also used to promote content retention after each topic area. Game questions were based on the content covered during the unfolding case studies or branching scenarios (discussed in the "Active Learning Strategies: Enhancing Student Learning and Facilitating Clinical Judgment in the Classroom during the Pandemic" section). These 'games' facilitated review of major learning points for students and alerted faculty to content areas where more instruction was needed. The benefits of this learning activity included reinforcement of content, more immediate feedback regarding student learning, and a gaming environment that generated student enthusiasm. Furthermore, students engaged in the activity online using their mobile phone or portable device, which allowed implementation both in-person and virtually.

The development of each active learning strategy took place over several months and implementation was refined through an iterative process spanning over three years. Each strategy, with the exception of game-based learning, relied on face-to-face delivery to achieve optimal results. During the COVID-19 crisis, faculty were challenged to modify these strategies to accommodate online learning delivery.

Active Learning Strategies: Enhancing Student Learning and Facilitating Clinical Judgment in the Classroom during the Pandemic

Novice-level students require learning activities that build foundational knowledge and skills. In contrast, advanced-level students need opportunities to test their knowledge of concepts and content through the application of clinical reasoning and clinical judgment. Accordingly, faculty teaching novice-level students focused on modifying theoretical classroom and psychomotor skills lab experiences. Faculty continued assigning pre-work for students to complete before attending class, where the focus remained on introducing theoretical concepts. The Zoom telecommunications platform was used to facilitate the classroom experience. Faculty used cameras to demonstrate the fundamental skills discussed during class, such as vital signs and body system assessments (Zoom Video Communications Inc., 2021). Family members and medical play dolls were used to aid in demonstrations. During class, students were encouraged to ask questions and engage in dialogue with their peers and course faculty. PowerPoint slides were used to display assessment findings, including potential abnormalities, for students to notate (Microsoft 365, Version 16, 2021). The faculty also played pre-recorded body system assessment videos so that students could identify abnormal assessment findings (i.e., adventitious breath and heart sounds). Similar to the pre-pandemic course, students were required to attend a corresponding skills lab to practice psychomotor skills. Faculty integrated Deliberate Practice Theory into these small lab group sessions by providing direct guidance and feedback via Zoom to students practicing psychomotor skills on camera (Zoom Video Communications Inc., 2021; Ericsson et. al., 1993).

The faculty also incorporated interactive patient scenarios and electronic health records from an online resource into classroom sessions to enhance student engagement. Faculty utilized Zoom to present a virtual patient to all students and assign students to breakout rooms where they discussed a plan of care, method of assessment, and potential findings in a small group (Zoom Video Communications Inc., 2021). Students returned to the main Zoom room after 15 to 20 minutes for discussion. The process of working through a patient scenario in small groups, followed by presenting their plan of care to the class, facilitated the development of clinical reasoning skills. If time ran short, students finished the assignment as homework and presented their plan during the next class session.

The flipped classroom and unfolding case study strategies used for advanced-level students required little modification for the online learning environment. The strategies in place, such as assigned pre-work to complete before attending class and the structure of the class itself, were carried into the online learning environment. Zoom was used to conduct class sessions where the focus remained on applying pre-work knowledge to case studies to practice critical thinking and clinical judgment skills (Zoom Video Communications Inc., 2021).

Unfolding case studies that were previously brought to life by human patient simulators required modification. Attending class remotely, students were unable to participate directly in the care of the patient. Instead, the faculty used the existing unfolding case studies to record videos of two instructors acting as nurses to provide direct patient care to a human patient simulator (See Figure 3). Faculty developed PowerPoint slides for each case with embedded video clips from the recording (Microsoft 365, Version 16, 2021). Each video clip displayed crucial decision points for the scenario. Faculty also developed a scripted orientation to the scenario that included patient information, history, and symptoms (See Figures 4a-e). The unfolding case study experience began with faculty reading the scripted orientation to students and using the "share screen" feature of the Zoom platform to play the first video clip (Zoom Video Communications Inc., 2021). Students were encouraged to engage in discussion about possible next steps and work through any disagreements about patient care. Students were then required to identify the correct next steps before the instructors played the following video clip. The instructors explored student thinking by asking why a specific action was the best next step. The instructors provided feedback and guidance during the discussion to clarify any misconceptions about content or application of content. This process allowed students to practice clinical judgment skills despite physical separation from the patient.

Another intervention developed specifically to facilitate student clinical reasoning and clinical judgment was the creation of a game-based activity that relied on effective decision-making skills. Pre-recorded video clips were used to create a computerized 'choose your own adventure' learning experience where students worked through an unfolding case. In this activity, software, at H5P.com, was used to embed video clips into a gaming program in which patient scenes were played out for the user (H5P.org, 2021). At the end of each scene, a critical decision was required. Two or more options were provided, with only one option being the right or best choice. The students were required to choose the correct response to move forward in the game.

Using a technique called branching scenarios, referenced earlier in the text, the simulation program created another form of immersive content to enhance participant engagement and learning (Jones & Devers, 2014). Branching scenarios are an advancement to unfolding case studies. The videos created for branching scenarios needed to feel more up close and personal, as opposed to the bird's eye view created using the school's existing audio-visual system to film most screen-based SBEs. This was accomplished by using a cellphone and handheld tripod. The videos were filmed by following the nurse to capture a third-person view. Once the raw footage was captured, the videos were edited so that visual enhancements and subtitles could be added.

To create depth of the branching scenarios, a flowchart was developed to show how the scenario should proceed based on participants' actions. The branching scenario was created to begin with an initial video, followed by a multiple-choice question. The participant was required to select an answer. Following the participant's selection, a video was played to show how the scenario would unfold, based on the decision. If the wrong choice was selected, the participant was redirected back to the question until they selected the right answer and watched the scenario unfold correctly. Once the correct answer was selected, the participants could progress to the next stage of the scenario. Branching scenario cases may also be used as a non-recorded activity, using presentation slides or pre-printed index cards.

Courses across the curriculum identified and developed new or revised existing active learning strategies to bridge the gap on hands-on learning in an online environment. Integral to each strategy was the goal of developing critical thinking, clinical reasoning, and clinical judgment. There were challenges for both students and faculty to achieve this goal when moving the curriculum to a fully online platform.

SOLUTIONS AND RECOMMENDATIONS

Implementing Innovative Active Learning Strategies

Challenges and Solutions in the Classroom

Before the pandemic, students and faculty were accustomed to face-to-face instruction with opportunities for hands-on skills training and practice that reinforced theoretical concepts. During the pandemic, technology platforms such as Zoom were relied upon to achieve curricular goals (Zoom Video Communications Inc., 2021). However, Zoom was new for many faculty and students. Technology limitations and issues were at the root of many challenges faculty and students faced. Table 1 outlines the challenges encountered and solutions created in the classroom setting.

Table 1. Challenges encountered and solutions created in the classroom

Challenges encountered	Solutions created
Unfamiliarity with technology	Creating detailed instructions on the use of the Zoom platform, including a list of FAQs
Connectivity issues	Recording sessions for students to review if they experienced connectivity issues
Unprofessional student behavior	Outlining expectations for class sessions, including attending class on time, remaining in the class for the entire session, keeping the camera on, muting the microphone unless speaking, displaying student name for identification, and attending class in an environment conducive to learning
Modification to school policies	School administrators developed guidelines in accordance with university policies and disseminated the information to faculty and students
Remote testing/test security	Remote testing was administered using a secured lock down browser and remote proctoring services with technical support
Feelings of isolation	Hosting virtual office hours and non-course related Zoom sessions where students get to know their classmates and course faculty; offering team building activities via Zoom; encouraging students to attend wellness informational sessions and other activities not tied to a course grade or outcome

Faculty and students were also required to use the school's online learning management system (LMS) at a greater capacity. Course faculty were encouraged to consult the school's Office of Information and Technology (OIT) department for support; however, the OIT resources were stretched thin due to the great need for support across campus. To decrease the strain on OIT, faculty provided students with guidelines on how to ensure compatibility with the LMS and how to access additional instructional resources provided by OIT (see Callout Box 3 in the Appendix and Table 4).

Application for Other Nursing Programs

Transitioning a traditional face-to-face course to the online learning environment poses many challenges that can be overcome with time and effort. However, when time is limited, utilizing resources already available through one's institution is key. Most institutions purchase access for faculty and students to resources such as the Zoom telecommunications platform, Microsoft Office, etc. (Microsoft 365, Version 16, 2021; Zoom Video Communications Inc., 2021). It is important to know what resources are at your disposal and to be familiar with them. Working with campus resource teams, such as OIT and in-house IT specialists, greatly benefits planning as these teams can alert faculty to potential challenges and barriers that may arise. Central to all decisions should remain the overall programmatic goals for student learning.

DEVELOPING CLINICAL SKILLS

Issues, Controversies, Problems

Innovations in Skills Lab: Enhancing Student Learning and Facilitating Clinical Judgment in the Skills Lab before the Pandemic

Historically, in the first semester of the baccalaureate nursing program, both concepts and skills are introduced in didactic lectures followed by student practice with instructor feedback in a skills lab setting. Novice-level students benefit from reinforcing theoretical concepts taught in the classroom by practical application of psychomotor skills in the lab setting. Before the pandemic, skills lab sessions were conducted face-to-face. At the beginning of each session, faculty provided large group demonstrations of the specific skills component taught before dividing students into small groups for psychomotor skills practice. One faculty member was assigned to each small group to facilitate practice sessions and provide direct feedback to students during face-to-face practice time. The Deliberate Practice Theory served as the theoretical underpinning for the development of skills lab practice sessions. The continuous cycle of repetition, guidance, and feedback was used to develop students' competency in psychomotor skills (Ericsson et. al., 1993). Once students demonstrated competency, they were further challenged to apply the skill to a simple scenario or case study to promote clinical reasoning. As students applied practical skills to a scenario, faculty asked probing questions to help students think through the 'why' behind their interventions. Skills lab practice sessions are intended to build upon theoretical concepts taught during classroom sessions. Therefore, if a gap in student knowledge was identified during skills lab practice, the content was re-addressed in subsequent classroom sessions.

Innovations in Skills Lab: Enhancing Student Learning and Facilitating Clinical Judgment in the Skills Lab during the Pandemic

To create a successful online learning environment for novice-level students, faculty determined that maintaining the structure of the skills lab sessions (e.g., small group sessions with a faculty facilitator providing guidance and feedback) was essential. The faculty identified the Zoom telecommunications platform as the best option to promote this environment (Zoom Video Communications, 2021). Students continued receiving conceptual information during scheduled synchronous classroom sessions. Skills labs were scheduled as a mixture of synchronous (i.e., students attend lab at an assigned time) and asynchronous (i.e., students complete lab activities on their own time during an assigned day) sessions. Students were divided into small lab groups consisting of 10 to 12 students per group. Each group was assigned a lab instructor who facilitated the delivery of lab content throughout the semester.

Many of the resources needed were contained in a book bundle purchased by students as they entered the professional program. The book bundle provided access to online textbooks and supplemental clinical resources such as clinical skills videos, written material, virtual health assessment clinical modules, electronic health records, and more. Students were assigned asynchronous activities using the book bundle's screen-based resources. For example, students completed various virtual health assessment clinical modules. In this resource, students had access to embedded clinical instructors, either avatars or pre-recorded virtual instructors, that assisted and provided feedback to the students throughout the activity. This was important as it mimicked the feedback students would normally receive during face-to-face skills lab practice. An electronic health record was provided for students to chart their patient assessment findings, similar to charting in the traditional clinical setting. Students were required to complete an assigned quiz before they could progress to the next module. Upon module completion, students were given a ‘virtual challenge’ that tasked them with identifying an abnormal assessment finding, identifying appropriate interventions, educating the patient, and documenting their findings.

Novice-level students were required to complete fundamental skills videos with corresponding quizzes to assess their learning each week. Additionally, lab faculty recorded themselves performing body system assessments. These videos were loaded on the LMS for students to view during their assigned asynchronous practice time. These videos replaced the in-person large group skills demonstrations typically provided at the start of each face-to-face lab session. Since the videos provided for the students were uploaded to the LMS, each student could view the video resource as often as needed. During synchronous lab sessions, small lab groups met with their assigned instructor via Zoom to ask questions and clarify content. Students were provided one-on-one Zoom sessions with their assigned instructor one to two times per week to receive individualized guidance and feedback on their psychomotor and assessment skills. Students demonstrated psychomotor skills using their laptop camera or personal device. Family members, friends, or stuffed animals served as patient stand-ins for practice. Instructors used Zoom to complete student check-offs where students were validated on skill acquisition (Zoom Video Communications Inc., 2021).

Skills lab sessions for advanced-level students incorporated strategies similar to those used for novice-level students. Prior to attending lab, students were assigned pre-work to reinforce theoretical concepts and introduce steps required to carry out specific skills. Faculty video recorded each other performing specific skills and loaded them on the LMS for students to view prior to attending lab. Student theoretical knowledge was assessed using online quizzes while skills acquisition was assessed by student-created videos of specific skills, which were uploaded to the LMS platform and graded by course faculty.

SOLUTIONS AND RECOMMENDATIONS

Innovations in the Skills Lab

Challenges and Solutions in the Skills Lab

Before the pandemic, the only paradigm for skills lab familiar to faculty and students involved face-to-face instruction. As an integral component of nursing education, it was essential for faculty to develop skills lab experiences for the online learning environment. The Zoom platform was used to facilitate synchronous lab sessions (Zoom Video Communications Inc., 2021). As with any technology, there were inherent challenges that faculty and students had to overcome. Faculty anticipated the Zoom platform would not be ideal for engaging large groups of students; therefore, students were divided into small groups facilitated by a single instructor for lab sessions. This presented a unique set of challenges to establish consistency among instructors and ensure equitable experiences for students. Please see Table 2 for challenges and solutions in the skills lab.

Table 2. Challenges encountered and solutions created in the skills lab

Challenges encountered	Solutions created
Communication of assigned synchronous and asynchronous activities	Amendment of the course topical outline to include more detail for both students and faculty; all assigned readings, skills videos, assessment recordings, quizzes, and class expectations were outlined for students
Consistency of teaching among all faculty for screen-based sessions	Faculty were provided with talking points detailing specific areas for discussion and clarification
Consistency of validating students among all faculty for screen-based skills checkoffs	Updated and revised rubrics were used for screen-based skills checkoffs
Faculty support and development in preparation for each lab session	Creation of a faculty folder in the LMS that housed all audio-visual aids and reference materials to enhance accessibility

Moving to fully online skills lab sessions presented challenges beyond the technology itself. Students reported feeling "cheated" out of in-person instruction. Faculty acknowledged student feelings and provided reassurance that they were receiving increased one-on-one instruction during their weekly Zoom skills lab meetings than previously provided in-person prior to the pandemic.

To accommodate the intensive nature of small group lab sessions, additional faculty were assigned to assist with skills labs. These additional faculty required training to become comfortable enough to fill the role of a small group lab instructor, as many of them had participated, but not led, skills labs in the past. Additional training on the supplemental skills resources was provided to faculty, as they were responsible for grading and answering student questions during small group lab time. Other training needs were addressed as they arose (see Callout Box 4 in the Appendix).

Application for Other Nursing Programs

Moving skills lab learning to a fully online format was a unique challenge for a practical discipline such as nursing. While all psychomotor skills are not ideally suited for such an environment, there are many skills that can be introduced. The examples provided demonstrate how faculty can use the resources students already have to support this process. Today, many book bundles include virtual resources with extensive resources for the online learning environment. Faculty should consider the overall programmatic goals for student learning in skills labs when planning activities and utilize the components of those resources that promote the achievement of programmatic goals. As one anticipates faculty and student education and technology support needs, work together with book resource representatives and school OIT personnel to build a plan for success.

SCREEN-BASED SIMULATION

Issues, Controversies, Problems

Innovations in Simulation: Enhancing Student Learning and Facilitating Clinical Judgment in the Simulation-Based Experiences before the Pandemic

Simulation-based experiences (SBEs) can be used to build upon theoretical course content and develop clinical reasoning and clinical judgment skills. Simulation activities can incorporate multiple modalities, including simulated clinical immersion, computer/screen-based classroom simulation, and hybrid simulation, among others. Simulation is another opportunity to reinforce theoretical concepts and provide students (novice and advanced) the opportunity to apply the practical skills learned in the skills lab during a simulated clinical experience. The repetition of theoretical concepts and skills during simulation allows students to demonstrate competency of skills, demonstrate clinical judgment, and voice their clinical reasoning behind selected interventions in a clinical scenario.

The simulation program in the school of nursing traditionally conducts simulation face-to-face through simulated clinical immersion. Simulated clinical immersion is a planned SBE where students engage in a scenario within a setting intended to replicate the real-world (INACSL Glossary, 2016c). In this type of SBE, students can fully interact with their environment and other participants as they navigate the scenario. Faculty facilitators guide students through three distinct phases of the SBE—pre-brief, scenario, and debrief—in accordance with the INACSL Standards of Best Practice (2016a). Pre-briefing includes establishing ground rules and a fiction contract, orienting students to the simulated environment, equipment, roles, time allotment, and patient report. These activities set the stage for students to engage in SBE and successfully achieve the intended objectives. Immediately following the scenario, faculty facilitators lead a debriefing session where students reflect on the scenario, including their actions and thought processes. Each of these components of SBEs were outlined in detail in a standardized simulation scenario template. Consistent use of a standardized template allowed faculty to quickly search for and identify specific scenario information and ensured consistency among faculty facilitators.

Before the pandemic, novice-level students participated in their first SBE at the end of the first-semester course. To prepare students, they attended an in-person orientation to the simulation lab to become familiar with the environment and the human patient simulators. For the SBE, student pairs were assigned to provide in-person care to a single patient. The students were required to incorporate knowledge and skills learned throughout the semester to respond to patient cues and provide safe and effective nursing care. Through SBEs, students practiced critical thinking, critical reasoning, and clinical judgment. This progression of learning from conceptual in the classroom, practice in the skills lab, to the culminating SBEs, is carried across the curriculum. Advanced-level students participated in SBEs throughout the semester that were designed as the concluding experience of a course unit. Once COVID-19 restrictions required transitioning from face-to-face to remote instruction, the simulation program had to adjust quickly to determine how to convert each aspect of the simulated clinical immersion experience to the screen-based simulation format without losing the integrity of the scenarios.

Innovations in Simulation: Enhancing Student Learning and Facilitating Clinical Judgment in the Simulation-Based Experiences during the Pandemic

In the transition to screen-based simulation, scenario templates were updated to reflect changes inherent to participating in a virtual environment. Changes included student objectives, student roles, scenario timing, verbiage, and patient scripts. Student objectives were revised and constructed according to SMART guidelines (specific, measurable, attainable, relevant, and time-bound) (INACSL Sim Outcomes and Objectives, 2016b). Advanced-level student objectives reflected clinical judgment exercises, whereas novice-level student objectives reflected communication, assessment, safety, and collaboration principles. The use of the standardized template ensured all aspects of the SBE were considered in planning the learning activity.

Novice-level students were assigned to complete the SBE in their small skills lab group, rather than pairs. As first-semester students, they had no prior knowledge of the simulation suite or resources. To create an immersive atmosphere for novice-level student orientation to the simulated clinical environment, faculty used a 360-degree camera to take photos of one of the simulated hospital rooms and medication room. The photos were uploaded to a 360-degree touring software, H5P.com, that allowed for the insertion of clickable pinned points (H5P.org, 2021). Clickable points were strategically placed on components inside of the simulated hospital environment where students needed additional instruction. When students activated the points, they received detailed information from a pop-up video or photo (see Figures 5 and 6).

All screen-based SBEs were implemented using the Zoom platform (Zoom Video Communications Inc., 2021). SBEs were recorded in the simulation suite using an existing audio-visual capture system. Simulation rooms were selected and outfitted for recording based on the specific SBE objectives. Simulation lab faculty and staff set up the environment according to instructions provided in the SBE scenario templates (see Figure 7). Faculty were assigned specific roles to portray, such as the primary nurse, secondary nurse, or charge nurse—roles the students would normally be assigned. Faculty participating in the recorded scenario were provided with brief instructions about what actions to perform and how to portray their role (see Figure 8). The brevity of instructions provided was both intentional and reflective of the lack of time to prepare for the transition to screen-based simulation. In some instances, this resulted in mistakes by the faculty member portraying a particular role. Rather than re-filming every mistake, the faculty agreed the mistakes should remain in the recorded scenarios and be used as talking points with the students during the debriefing session.

Screen-based SBEs were conducted via Zoom (Zoom Video Communications Inc., 2021). Other web-conferencing platforms were explored, but faculty familiarity, ease of use, meeting capacity, waiting room options, and shared host responsibilities influenced the decision to use Zoom. Zoom rooms (ZRs) were set up for participant groups before scheduled SBEs. At least two faculty facilitators were assigned to each ZR to ensure SBEs could continue to run if one facilitator experienced technical difficulties, even though some SBEs only required one facilitator. Facilitators were added to the ZRs as alternative hosts, giving them the same permissions and controls as the simulation team, (i.e., admitting students, sharing their screen, etc.). The 'waiting room' option was always enabled to permit facilitators to have control over who entered each SBE, thereby ensuring participants entered ZRs at the appropriate time. For subsequent sessions, students were not admitted into the ZR until the prior SBE was completed. Facilitators were able to communicate with students in the waiting room via the chat option. This allowed facilitators to communicate any delays in start times or redirect students who entered the wrong waiting room (Zoom Video Communications Inc., 2021).

PowerPoint slides were designed to guide facilitators and students from pre-brief to debrief throughout each screen-based SBE (refer to Figures 4a-e) (Microsoft 365, Version 16, 2021). The PowerPoints included an outline of the SBE agenda, embedded scenario video clips, slides with questions between video clips, and a QR code for participants to scan and complete a post-simulation survey. Facilitators were provided with the full SBE scenario template to use as a companion guide to the SBE PowerPoint. The scenario templates included additional details students were not privy to. Facilitators used the screen share feature in Zoom to share the PowerPoint with participants (Microsoft 365, Version 16, 2021; Zoom Video Communications Inc., 2021). Slides appearing between embedded video clips included specific questions for students to consider. Students were allowed time to reflect on the previous video clip, consider what was done well, what should be done differently, and what their next steps should include. Additionally, facilitators used these pause points for discussion to ensure students were engaged in the scenario and participating actively in the SBE, rather than observing passively.

Debriefing is a reflective process that immediately follows an SBE and is led by a trained facilitator using an evidence-based model (INACSL Glossary, 2016a). Participants are encouraged to reflect on their emotions, the experience itself, and provide one another with feedback. Before COVID-19, participants in the simulation program would engage in the debriefing session face-to-face in a separate setting from the SBE scenario. In the Zoom environment, facilitators stopped sharing their screen so that everyone was more easily visible, participants made sure their cameras were turned on, and microphones were unmuted to promote an environment where anyone was free to speak up (Zoom Video Communications Inc., 2021). Facilitators followed the Promoting Excellence and Reflective Learning in Simulation (PEARLS) debriefing model. The PEARLS model accommodates multiple debriefing theories and allows flexibility among facilitators based on the specific SBE and their level of expertise in debriefing methodology (Eppich & Cheng, 2015).

Upon completion of debriefing, facilitators shared the PowerPoint slide with a QR code for participants to scan and complete a post-simulation survey. A link to the survey was also made available for facilitators to send to participants who were unable to scan the QR code. The post-simulation survey includes the Simulation Effectiveness Tool-Modified (SET-M), which summarizes viewpoints of students' feelings of understanding and confidence related to the SBE (Leighton et al., 2015). The SET-M was updated by its creators during the pandemic to be more inclusive of the virtual simulation format. The simulation program updated its post-simulation survey to reflect those changes for participant evaluation of screen-based SBEs. Participants were required to show facilitators the final screen that states, "Thank you for completing this evaluation" before exiting the session. This resulted in a 100% survey completion rate. The post-simulation survey was completed for every SBE for quality improvement purposes. The SET-M is a popular simulation evaluation tool and free to use by the developers. A separate post-simulation survey was developed for facilitators to communicate their opinions, relate challenges encountered, and suggest improvements for subsequent SBEs (see Callout Box 5 in the Appendix).

SOLUTIONS AND RECOMMENDATIONS

Innovations in Simulation

Challenges and Solutions in the Simulation-Based Experiences

One challenge inherent to the transition to screen-based SBEs was the preparation and training of faculty and staff who were required to implement SBEs. Faculty and staff operated at various levels of technological savviness and in the remote setting, faced different challenges related to internet stability and bandwidth. Additionally, faculty were balancing multiple responsibilities, all competing for time. Table 3 lists the challenges encountered, and solutions created in the simulation realm.

Table 3. Challenges encountered and solutions created in simulation

Challenges encountered	Solutions created
In-person training sessions one week before the scheduled event not feasible during COVID-19 restrictions	Recorded virtual run-through sessions for each screen-based SBE; information reinforced through an email sent to all faculty participants
Scheduling online training sessions at a time that worked for all faculty participating in the simulation	Recorded virtual run-through sessions emailed to all faculty participants to view asynchronously as schedules permit with the option of viewing multiple times
Faculty unfamiliarity with the Zoom format and features	Synchronous Zoom training options offered to assist faculty who required additional help with Zoom format and features
Technology issues during the screen-based simulation	On-call technology team assigned as alternative hosts to all Zoom Rooms and available to enter Zoom Rooms experiencing technology issues

Post-simulation surveys were completed after every screen-based SBE. Initially, surveys were emailed to students upon completion of the SBE. However, there was no accountability as the surveys are anonymous and consequently many students did not complete the surveys. As a result, post-simulation surveys were embedded into the final slide of the screen-based SBE PowerPoint using a scannable QR code. One hundred percent of students completed post-simulation surveys once QR codes were used.

The post-simulation surveys provided insight into challenges faced by students. Early in the transition to screen-based SBEs, student groups varied in size from four to eight per group. Surveys revealed that screen-based SBEs with student groups larger than six led to feelings of confusion and frustration, with students indicating they were unsure of when to speak and felt lost in the chaos. In response, screen-based simulated clinical immersion group sizes were limited to six students.

Applications for other Nursing Programs

Screen-based SBEs are one solution to providing students with unique clinical experiences where they have the opportunity to apply clinical judgment skills to a patient scenario. The examples provided can be applied by other programs using the technology they have available. Programs without multiple types of simulated hospital rooms can enhance environmental realism by bringing in equipment, supplies, and/

or simulators that mimic the real-world setting. Most cell phones today include high-quality video cameras that can be used to film scenarios. Once recorded, editing software is needed to trim, cut, and add visual enhancements to make the scenario feel more realistic. Many computers come with basic editing software that can be used for these purposes. With a little creativity and a lot of teamwork, programs can achieve similar results to those outlined above.

FUTURE RESEARCH DIRECTIONS

Nursing programs were forced to rely heavily on technology to deliver classroom, skills lab, and simulation experiences. The transition to the online learning environment occurred rapidly and many programs are just now seeing the impact of this transition on student learning outcomes. While preliminary data, such as self-report student surveys and student exam scores, indicate that students were able to successfully achieve the intended learning outcomes, more rigorous research is needed to determine whether the technology used to replace face-to-face experiences is sufficient. Future research should focus on evaluating the use of technology to achieve specific student learning outcomes across multiple cohorts. Further, students' application of critical thinking and clinical judgment skills should be evaluated as students matriculate through the program. This evaluation should focus on determining if the use of technology in the classroom, skills lab, and simulation experiences facilitates the overall programmatic goal to develop clinical judgment.

CONCLUSION

Over the past year, COVID-19 significantly impacted how education for all disciplines is being delivered, requiring rapid and often unproven adaptations in order to meet the needs of all learners. Throughout the pandemic, numerous adjustments were necessary to ensure a safe environment for learners and faculty. While the mode of instruction and teaching may have changed, the standards of teaching, practicing, and developing nursing skills and knowledge have not. The overarching goal for all nursing programs is that their graduates are considered safe to practice nursing. A nursing student's ability to safely practice nursing is verified by successful completion of the National Council Licensure Examination (NCLEX). The NCLEX essentially validates the candidates' ability to practice safely by measuring their potential to critically think and apply clinical judgment in nursing practice. To teach nursing students critical thinking and clinical judgment, it is requisite that they engage in decision-making processes similar to what nurses do daily. Before the pandemic, this involved students interacting face-to-face with other students and faculty to manage unfolding case studies by using critical thinking skills to engage in effective clinical judgment. However, during the pandemic, the challenge became "How do you develop clinical judgment without the face-to-face interaction among students and faculty members?" Throughout the pandemic, the author's organization demonstrated the capability to continue teaching effective clinical judgment skills as demonstrated by student performance in standardized testing such as the NCLEX. By implementing the creative interventions outlined above we believe any organization is capable of achieving similar outcomes in regards to effectively teaching clinical judgment.

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KEY TERMS AND DEFINITIONS

Clinical Judgment: The ability to respond to patient cues with appropriate clinical decisions and is regarded as an essential skill for safe and effective nursing practice.

Critical Thinking: The intentional, logical thought process intended to respond to and improve patient outcomes.

Simulated Patients: Individuals trained to act as real patients in order to simulate a set of symptoms or medical conditions.

Simulation: Impersonation of a real-life situation or process

Simulation-Based Experience: Instructional scenarios where nursing students are placed in a simulated clinical experience. In this SBE the clinical event or activity can be replicated using manikins, or simulated patients.

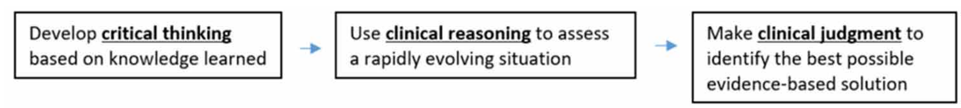
Unfolding Case Studies: Short, written scenarios in which the case evolves in a way that is unpredictable for the learner.

Zoom: A video conferencing platform used to allow groups of people to meet synchronously online with or without video.

Zoom Rooms: Breakout rooms that allow for small group activity outside of the larger platform.

APPENDIX

Figure 1. Progression of critical thinking to clinical reasoning to clinical judgment.

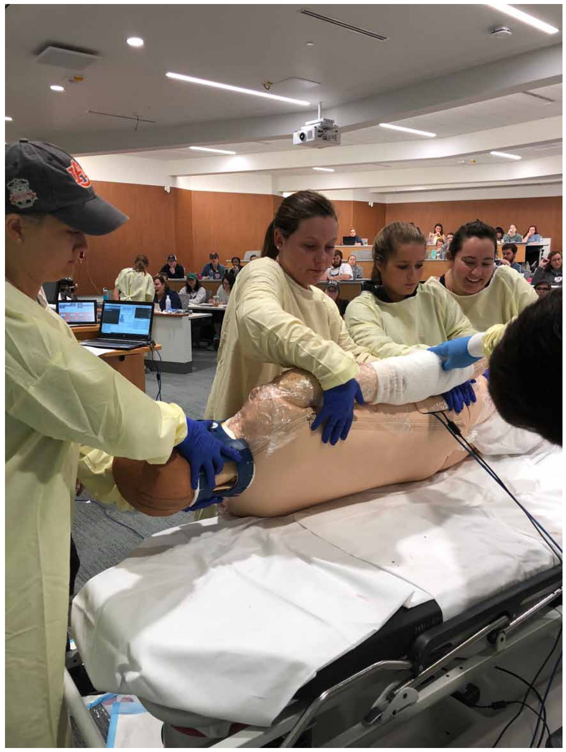


Callout Box 1

The following example demonstrates how clinical judgment is exercised in nursing and shows the decision-making process a nurse might go through when administering blood pressure medication to a patient. Prior to administering medication, the nurse checks the patient's heart rate and notes it is 50 beats per minute. The nurse identifies that the patient has a low heart rate. The nurse also recognizes that this blood pressure medication lowers an individual's heart rate. Based on the above cues the nurse must make the clinical decision to either administer the medication or hold the medication. The safe decision would be to hold the blood pressure medication and monitor the patient's blood pressure to ensure it does not become elevated. If the medication were to be given, the patient could suffer from complications related to an abnormally low heart rate. Nurses must critically think and make clinical judgments similar to this example multiple times during a typical shift.

Figure 2a.

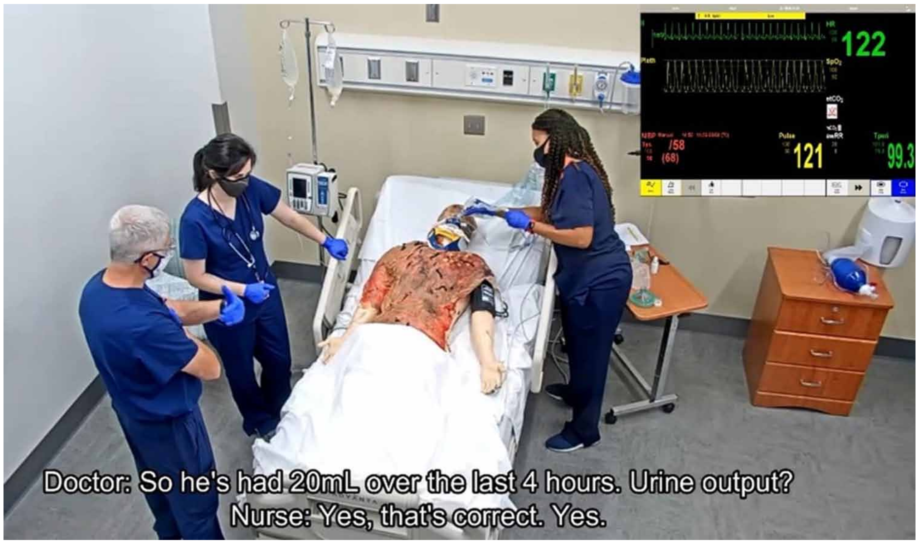
Figure 2b.
**Please note these pictures were taken before the pandemic. Unfolding case studies brought to life by human patient simulators.*



Callout Box 2 (to accompany Figures 2a and 2b)

To begin the unfolding case study, the instructor randomly selected groups of five or six students to aid in the care of the case study patient. The students assisted the instructor in managing the clinical case scenario and care of the patient, which included performing assessments and implementing nursing interventions relevant to the specific case study. High-resolution cameras mounted in the ceiling tracked all actions and interventions implemented by the student assistants, and displayed them on monitors around the room to enable everyone to have access to the same visual information and patient cues. Students in the audience were encouraged to participate by helping their classmates working with the human patient simulator to identify appropriate interventions based on the cues given, creating an interactive experience for all students. Facilitating care of the patient in real-time allowed the instructor to explore students' thinking processes. Rather than simply stating what they would do next, students were asked to explain their rationale, which allowed the instructor insight into whether or not the person answering understood the content and was able to apply it correctly to make a safe and effective decision about patient care. Gaps in knowledge or application of the content that were uncovered during this process were able to be addressed immediately through a continuous cycle of feedback as the instructor and students worked together to manage the care of the patient. For programs with fewer resources, unfolding cases can also be completed with role-playing, pre-recorded videos, or presentation slides.

Figure 3. Pre-recorded video screenshot. Faculty played the roles of student nurses providing care to the patient simulator.



Callout Box 3

But Did it Work?

As with every new intervention or modification to a curriculum, it is important to know if what you intended to improve did improve. When faculty moved from the typical lecture-style presentations to begin using case studies and large group simulation in the classroom, the intention was to improve student critical thinking and clinical judgment. While these concepts are difficult to measure, student course evaluations and the program's NCLEX pass rate for first-time test takers provided encouragement that the strategies work. Student evaluations were overwhelmingly positive with students taking the time to write comments like *"I didn't think I would like this format, but I actually learned better this way…I retained more information", "learning this way helped me think like a nurse", and "this learning style helped me put the pieces of the puzzle together"*. Faculty were exceedingly pleased when course evaluations during the pandemic mirrored the same feedback received for courses prior to the pandemic. Another indicator of success is NCLEX pass rates for first-time test-takers. In the table are our NCLEX pass rate for the past three years. As demonstrated, the pass rates have continued to improve since beginning the use of case studies and simulation in the classroom. We did not expect this performance to continue due to the pandemic. However, our first cohort to graduate during the pandemic had a first-time pass rate of 99.01%.

Table 4. (to accompany CALL OUT BOX 3)

Calendar year 2018	95.51%
Calendar year 2019	98.90%
Calendar year 2020	99.01%

Figure 4a. Start with a prebrief

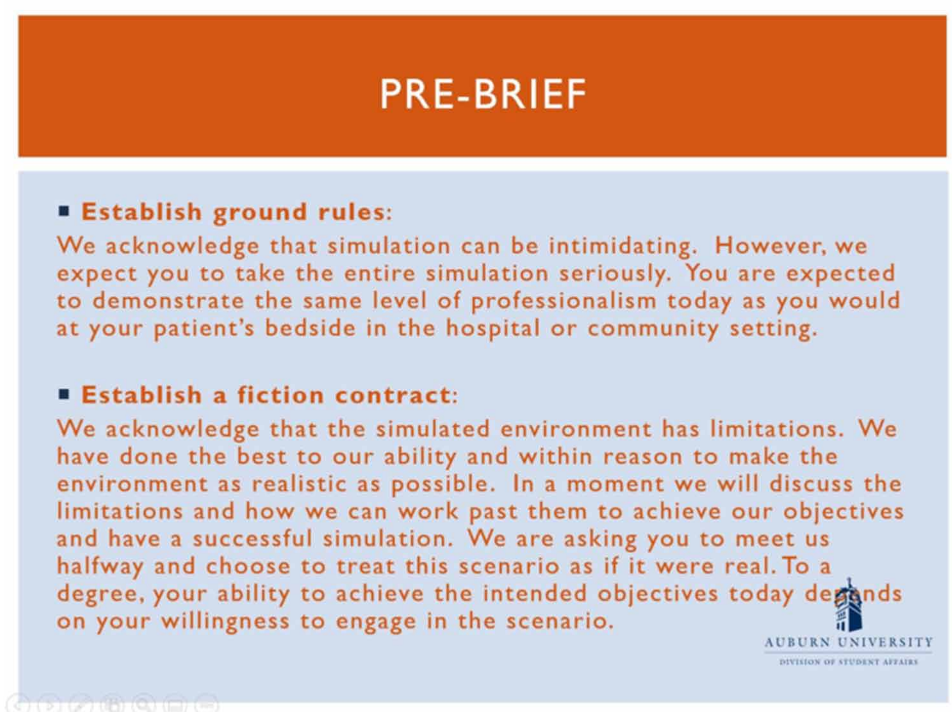


Figure 4b. Video clip of short scenario

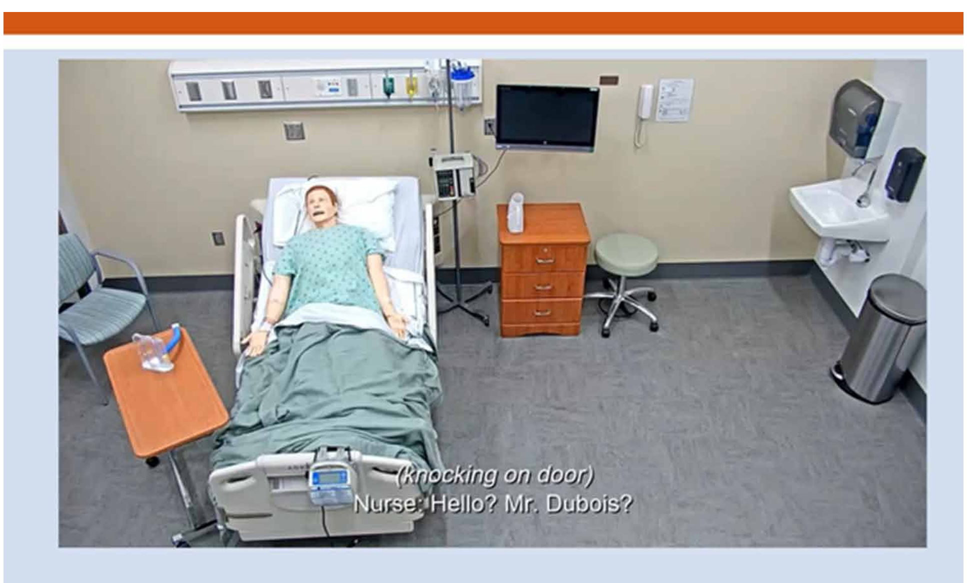


Figure 4c. Question(s) with a guided discussion regarding the short scenario

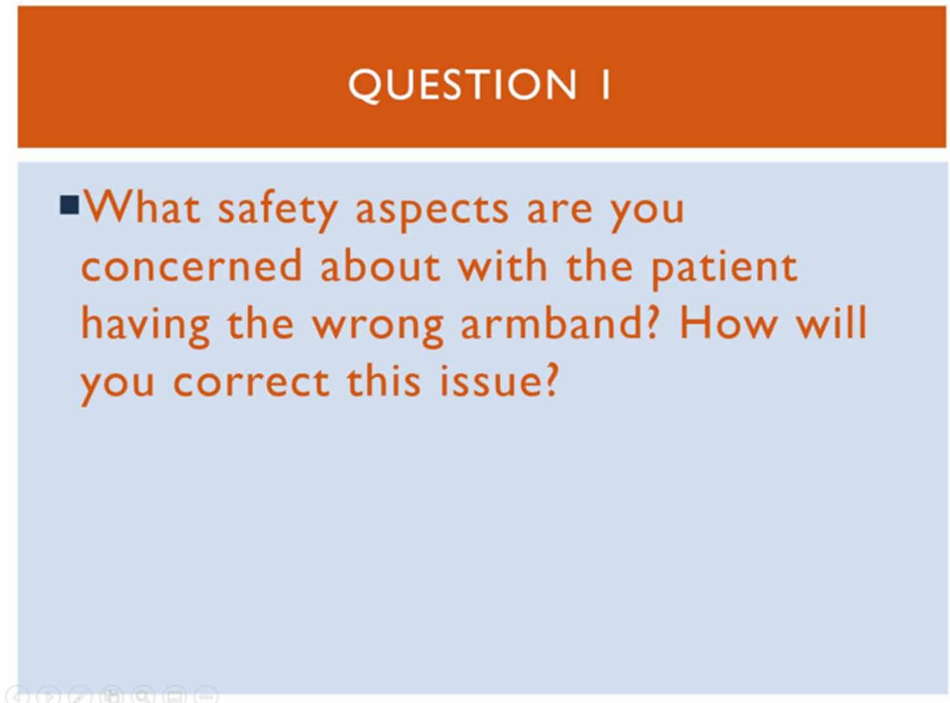


Figure 4d. Video clip of another short scenario/or action chosen from the previous question

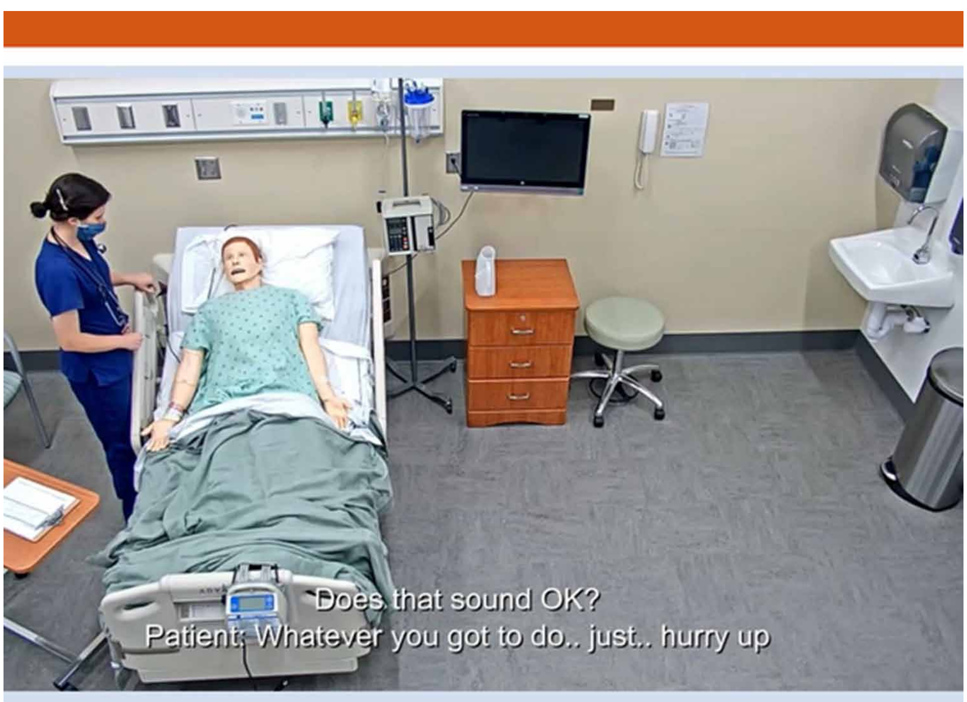
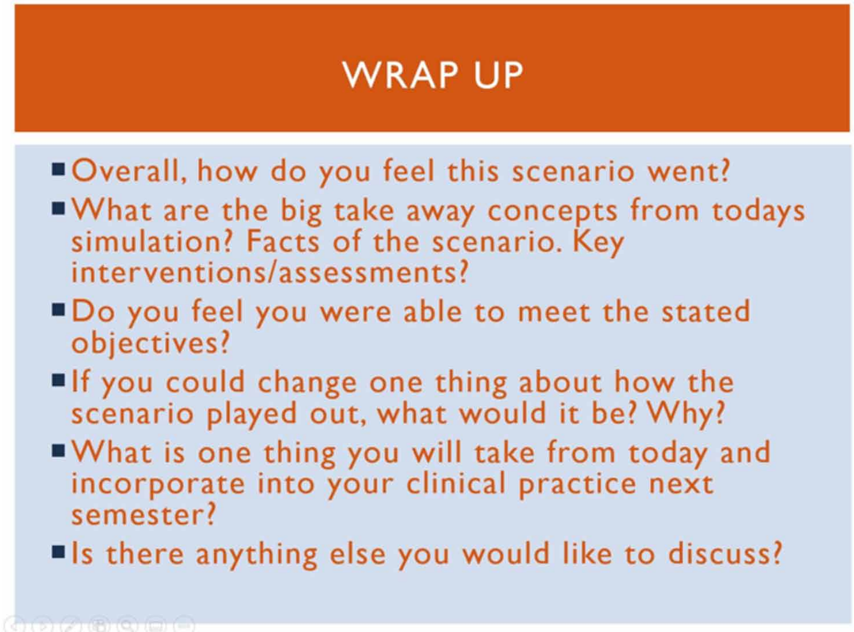


Figure 4e. Debrief the screen-based SBE



Callout Box 4

But Did it Work?

The changes made to skills lab experiences greatly impacted novice-level students. The impact of first semester curricular changes is evident in subsequent semesters. Faculty in the advanced-level nursing courses commented that student performance, particularly head-to-toe assessment skills, improved during the pandemic. Although teaching some psychomotor skills (e.g., medication administration or obtaining a blood pressure) is better suited for the in-person environment, health assessment skills appear to be well-suited for the online learning environment.

Figure 5. 360-degree photo with clickable points.

Figure 6. Once a point is selected, more information is revealed.

Callout Box 5

But Did it Work?

Screen-based SBEs required adjustments from students and faculty alike. At the beginning of the pandemic, while the transition was still very new to all, students reported increased confidence and decreased nervousness as they were able to watch and learn from the pre-recorded SBEs. Initial feedback included, "*I wish it was in person but it was still a great opportunity to think critically and apply some of the skills I have learned this semester,"* as well as *"I liked how this simulation was formatted better. I liked how we were able to watch the scenario and then discuss."* Based on the post-simulation survey feedback from faculty and students, some screen-based SBEs resulted in better student outcomes, learning, and comfort level. Additional student comments from various screen-based SBEs included, *"this is a very good experience. I'm thankful you guys recorded these for us, very nice to have an onlooker perspective," "I really like doing this virtually. I feel like a learn more. When I do it in person I'm so nervous that I forget what we did,"* and *"despite having to do this online, I felt like this was a really beneficial simulation. I think it worked well considering the circumstances!"* Thankfully, many of the students were understanding and appreciated the value of the new format.

Figure 7. Sample template of the acute myocardial infarction SBE.

AUSON Simulation

Patient:

Scenario:

Simulation Course Title:

Fidelity

Setting/Environment:
- ☐ ER
- ☐ Med-Surg
- ☐ Peds
- ☐ ICU
- ☐ OR / PACU
- ☐ Women's Center
- ☐ Behavioral Health
- ☐ Home Health
- ☐ Pre-Hospital
- ☒ Other: intermediate care unit

Simulator Manikin/s Needed:
SimMan 3G

Props:

Equipment Attached to Manikin:
- ☒ IV tubing with primary line fluids running at **20 mL/hr to 20G left hand, saline locked**
- ☐ Secondary IV line running at mL/hr
- ☒ IV pump
- ☐ Foley catheter ☐mL output
- ☐ PCA pump running
- ☐ IVPB with running at ☐ mL/hr
- ☐ 02
- ☐ Monitor attached
- ☒ ID band **Julian Parker, MR# 4873011, Physician: Phyllis Hartman, MD**
- ☐ Other:

Equipment Available in Room:
- ☐ Bedpan/Urinal
- ☐ Foley kit
- ☒ Crash cart with airway devices and emergency medications
- ☒ Defibrillator/Pacer

Medications and Fluids: (see chart)
- ☒ IV Fluids **D5 ½ NS**
- ☐ Oral Meds
- ☐ IVPB
- ☐ IV Push
- ☐ IM or SC

Diagnostics Available: (see chart)
- ☐ Labs
- ☐ X-rays (Images)
- ☐ 12-Lead EKG
- ☐ Other: Echocardiogram

Documentation Forms:
- ☐ Provider Orders
- ☐ Admit Orders
- ☐ Flow sheet
- ☐ Medication Administration Record
- ☐ Graphic Record
- ☐ Shift Assessment
- ☐ Triage Forms
- ☒ Code Record
- ☐ Anesthesia / PACU Record
- ☐ Standing (Protocol) Orders
- ☐ Transfer Orders
- ☐ Other:

Recommended Mode for Simulation:
(i.e., manual, programmed, etc.)

Student Information Needed Prior to Scenario:
- ☒ Has been oriented to simulator
- ☒ Understands guidelines /expectations for scenario
- ☒ Has accomplished all pre-simulation requirements

Figure 8. Lab faculty and staff portraying roles of the nurses taking care of the simulated patient.

Chapter 9
Administering Interactive Simulations to Supplement Traditional Clinical Placements

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ABSTRACT

This chapter aims to enhance the ability of healthcare educators to identify learner skill levels, develop and implement an appropriate simulation or scenario-based learning technique, and provide optimal feedback to refine clinical reasoning and decision-making development of the learner. The concept of problem-based learning is outlined and applied to the creation of virtual patient cases to augment clinical experiences for healthcare students amidst the COVID-19 pandemic. Through the use of appropriately targeted learning objectives, case design, and feedback strategies, students will be able to continue their professional and academic development in a post-pandemic landscape.

INTRODUCTION

The landscape of clinical education across all disciplines of healthcare is at a crossroads as the need for clinicians continues to rise while the educational opportunities for face-to-face, hands-on learning diminished in the midst of a pandemic. Despite hope that the world will return to pre-pandemic conditions, the reality is post-pandemic education has already been forever changed. Clinical sites have been forced to drastically alter the number and type of opportunities for healthcare students due to capacity and policy changes secondary to COVID-19. Throughout the pandemic educators in every discipline of healthcare have had to re-imagine ways in which students can still obtain the clinical skills necessary to

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become competent, entry level professionals who can demonstrate critical thinking, clinical reasoning, and sound clinical decision making as healthcare professionals.

The theoretical basis for this chapter stems from evidence regarding simulation and clinical development found within a variety of healthcare educational settings, including nursing, athletic training, physical therapy, and others. There is evidence within the literature of various healthcare fields to support clinical skill development using simulation and telemedicine (Silberman et al, 2016; Winkelmann & Eberman, 2020). These types of techniques also allow for improvements in the self-efficacy of students who participated in these alternative clinical learning techniques (Nicol & Macfarlane, 2006). Furthermore, the ability to move learners from novice to competent healthcare providers using online simulation techniques is well supported (Galloway, 2009). The recent pandemic has forced healthcare educators to become innovative in the delivery of the curriculum while leaning on the current body of knowledge around simulation and online methods of teaching that aim to improve clinical performance. The need for innovation, however, is limited by the financial realities of the post COVID-19 economic impact on higher education. This reality has forced educators to critically consider the financial efficiency of their pedagogical modifications to maximize learner benefits within the budgetary constraints of the institution, which forced educators to be focused on the value added in pedagogical additions. The post-pandemic literature will need to highlight the evolving pedagogical strategies and fresh perspectives on the delivery of healthcare education.

The objective of this chapter is to describe the evidence and efficacy behind simulation-based education and provide key strategies for the use of virtual scenarios in healthcare education, particularly in the development of clinical reasoning and clinical decision making. The initial objectives of this chapter are to define and apply the concepts of clinical reasoning and decision making in the context of the stages of student clinical development. Furthermore, this chapter will synthesize the current state of the evidence in clinical skill development in a virtual environment from across various healthcare fields. Following this fundamental understanding, educators will be able to implement that knowledge base moving forward in the design of clinical scenarios to meet the desired outcome based on the current clinical development level of the student.

BACKGROUND

The ultimate goal of the healthcare educator is to ensure the learner establishes the necessary skills to practice in a safe and independent manner upon completion of their educational experience. This requires sound foundational knowledge, critical thinking skills, and the ability to demonstrate appropriate clinical decision-making. Clinical decision making is described in the literature as “decisions with multiple foci, (e.g., diagnosis, intervention, interaction, and evaluation) in dynamic contexts, using a diverse knowledge base, with multiple variables and individuals involved” (Higgs et al., 2008, pp. 89-90). Clinical decision-making is increasingly valuable as the settings and complexity of the healthcare system continue to evolve, as the knowledge base of practitioners expands, and the known variables impacting patient care broaden. The ability of healthcare students to navigate this dynamic and diverse environment and make appropriate decisions is increasingly challenging and requires extensive training and exposure to clinical situations to refine the decision-making process and identify the key variables needed to make an appropriate decision that optimizes patient outcomes. It relies heavily on the skill of clinical reasoning, which has been defined as “the reflective thought process that therapists undergo to integrate client evaluation information and to develop and implement intervention plans" (Scaffa & Wooster, 2004, p. 335). Clinical reasoning is widely considered to be essential for clinical practice (Higgs et al., 2008), and accordingly, is highly coveted in the development of healthcare students.

Deficits in clinical decision-making can have catastrophic outcomes on patient care, as it is estimated that up to 100,000 deaths occur each year in the United States due to diagnostic failure (Leape et al., 2002). Furthermore, it is estimated that up to 1 million of the 2.4 million deaths in the United States in 2000 were premature and due to provider decisions (Keeney, 2008). To minimize such adverse outcomes attributed to human error, it is critical that healthcare educators foster and assist with the development of clinical decision-making skills using whatever tools are available.

The process of clinical decision-making has multiple steps, including "hypothesis generation, cue interpretation, and hypothesis evaluation to the endpoint—the implementation of appropriate interventions" (Dowie & Elstein, 1988, pp. 50-55). Furthermore, Wainwright et al (2011) propose several components influencing clinical decision making, including prior academic and clinical experiences, the location of information sources evaluated, and reflection of the practitioner in action. In addition, they indicate that experienced clinicians utilize observations and interactions with patients, along with past experiences from the clinicians to guide clinical decisions, compared to novice clinicians who rely heavily on medical charts and biomedical theory (Wainwright et al., 2011). This demonstrates the value of pattern recognition and clinical experience in the development of clinical decision-making skills.

Clinical skill and clinical decision-making have traditionally been taught using a combination of didactic instruction and psychomotor practice with in-person clinical educational experiences for students, specifically in-person clinical placements alongside an experienced clinical instructor in the proposed clinical environment. This dual-educational method of classroom-based education with clinical integration allows for the theoretical development of clinical skills and decision making in a no-risk environment in the classroom, which can then be reinforced with the low-risk supervised clinical experience under the watchful eye of an experienced and licensed clinical provider. This clinical skill and decision-making scaffolding approach from lecture to laboratory to clinic allows for students to have optimal retention and application of the appropriate psychomotor skills and thought processes to begin forming clinical pattern recognition, which is demonstrated to improve clinical outcomes (Asgari et al., 2019).

However, in light of the pandemic and its impact on clinical educational placements, the integration of psychomotor and clinical decision-making skills in the clinical setting has been disrupted, as clinical placements have become more restrictive in their ability to provide supervised clinical experiences. This has led to many healthcare educators seeking technological and virtual environments to allow students to integrate their clinical decision-making skills in a no-risk environment, while still providing a progression from the frequently context-free environment of a classroom. Fortunately for healthcare educators, there is a growing body of literature outlining the efficacy of virtual and technologically mediated environments in the development of clinical skills and clinical decision-making in healthcare professionals. Research has shown that in nursing students, online instruction was equally effective in the teaching of clinical skills compared to on-ground traditional instruction (McCutcheon et al., 2014).

In addition, there have been substantial financial implications in higher education as a result of the pandemic. It has been estimated that institutions of higher education suffered a 14% loss in revenues over the fiscal year 2020 and 2021, which includes an estimated $85 billion in lost revenue, $24 billion in COVID-19 related expenses, and $74 billion in estimated future funding decreases (Friga, 2021). Educators have seen budget freezes, cuts, and staffing decreases as mitigation for those financial losses. This has forced institutions to make modifications to the curriculum at no cost to the institution in psychomotor and clinical-decision making acquisition. While COVID-19 brought these fiscal challenges to bear in a sudden and shocking manner, financial struggles for higher educational institutions are likely to persist, as birth rate changes show a 'demographic cliff' approaching, in which it is estimated will peak in 2025 (Zahneis, 2021). Accordingly, innovative and fiscally responsible pedagogical strategies must continue to be developed by faculty and institutions of higher education for the foreseeable future.

Despite the modality through which one teaches, the process of skill acquisition, development, and decision making is experiential, requiring the learner to pass through varying levels of proficiency. The Dreyfus model describes these levels of proficiency as novice, advanced beginner, competent, proficient, and expert (Peña, 2010). Benner (1984) later established a model of skill acquisition based on the work of the Dreyfus model and applied it to nursing education.

Benner's (1984) five stages of clinical development are described as:

Stage 1: Novice

Beginners have had little to no experience of the situations in which they are expected to perform. Novice practitioners are taught rules to help them perform. The rule-governed behavior typical of the novice is extremely limited and inflexible. Therefore, novices have no 'life experience' in the application of rules. Students who enter healthcare education programs are typically novice learners and may easily become overwhelmed when presented with excessive externalities, as they frequently fall into the comfort of 'memorizing a rule.' Students in this stage are typically entering their first clinical placement and should be expected to perform skills that do not require critical thinking or interpretation of information (such as the taking of vital signs), as they do not have the clinical experience to appropriately perform tasks with higher levels of critical appraisal required. Novices will require clear, direct, and unwavering rules to follow after performing a basic task (e.g., notification of their supervisor of any finding over a set benchmark). Novices require extensive and direct clinical oversight by their preceptor or supervisor, who will need to provide clear and specific instructions to the novice for each task they are expected to perform (Benner, 1984; Levy et al., 2009).

Stage 2: Advanced Beginner

Advanced beginners can demonstrate marginally acceptable performance, those who have coped with enough real situations to note (or have been instructed by a mentor), recurring meaningful situational information. These components require prior experience in actual situations for recognition, and therefore these students are typically in the later stages of their clinical curriculum. Principles to guide actions begin to be formulated through their past clinical experiences and the initiation of pattern recognition. Students in this stage traditionally struggle with the prioritization of information and treat all information as equally important and relevant, which can hinder their ability to triage accurately. For example, students in this stage are able to perform or administer relevant diagnostic testing but are unable to determine the relative urgency of the results. Advanced beginner students also require direct clinical supervision, as their inability to prioritize can lead them to become overwhelmed by the amount of information they need to manage and interpret. However, as they have obtained prior experience in clinical care, they require less direct management from preceptors and supervisors and should be mentored in the ability to triage tasks in a thoughtful and deliberate manner. Preceptors and supervisors can begin to perform in a more supportive and delegatory role, as the mentoring of students in this stage allows for them to develop into independently practicing autonomous clinicians (Benner, 1984; Levy et al., 2009).

Stage 3: Competent

The competent practitioner develops plans to distinguish less important from more important context. Competent practitioner's plans establish a perspective and are based on considerable conscious, abstract, analytic contemplation of the problem. The conscious, deliberate planning that is characteristic of this skill level helps achieve efficiency and organization. It is at this stage that the practitioner may begin to feel mastery of their day-to-day activities and can begin to manage the contingencies associated with clinical practice without substantially increased stress. Competent practitioners are the traditional goal of university educators in healthcare professions, as graduates are able to perform skills at a level of comfort with day-to-day tasks. They are further able to perform effectively and efficiently in the team-based approach to healthcare and thus can continue their growth while demonstrating effective patient-centered care. Competent practitioners are able to perform independent clinical practice; however, they are continuing to grow in their clinical management skills. Competent practitioners should be mentored in a manner that allows them to further refine their pattern recognition to allow for easier identification of an abnormal patient presentation (Benner, 1984; Levy et al., 2009).

Stage 4: Proficient

The proficient practitioner perceives situations as wholes rather than in terms of chopped-up parts or aspects, and performance is guided by situational factors. Proficient learners rely on prior learned experience of what typical events to expect in a given situation and how plans need to be modified in response to these events. As a result, the proficient practitioner can now recognize when the expected normal picture does not materialize. Practitioners in this stage can readily identify the most important information from a clinical picture and make nuanced decisions about clinical care based on varying externalities. They prefer to learn from clinical cases rather than through abstract rules, as they frequently identify instances where the axiom of clinical practice is violated due to an externality (e.g., What about in this case…?) (Benner, 1984).

Stage 5: The Expert (5+ years of experience)

The expert practitioner no longer relies on an analytic principle (i.e., rule, guideline) to connect their understanding of the situation to an appropriate action. The expert operates from a deep understanding of the total situation and is no longer aware of features and rules; their performance becomes fluid and flexible and highly proficient. Experts have an intuitive grasp of the clinical picture due to their extensive clinical experience and the identification of patterns not obviously apparent to less experienced clinicians. One challenge to experts is the potential to struggle to explain their clinical reasoning to less experienced practitioners, as they rely on subconscious reasoning and pattern recognition to guide their clinical care (Benner, 1984; Levy et al., 2009).

The Benner stages reflect changes in two general aspects of skilled performance. The first developmental leap is a movement from reliance on abstract principles to the use of past concrete experience as paradigms. The second is a change in the learner's perception of the demand situation, in which the situation is seen less and less as a compilation of equally relevant bits, and more and more as a complete whole in which only certain parts are relevant.

Applying Benner's stages of clinical development, healthcare educators and clinical preceptors can begin to identify the stages of the learner to practitioner development. After identifying the learner's stage, the educator can begin to challenge the learner in an appropriate manner through utilizing questions and obstacles. This will guide the learner to the next stage of development while ensuring the learner is not overwhelmed or under-stimulated. This optimal amount of stimulation creates an environment ripe for student growth and engagement.

One method for fostering the development of students into clinicians that has been utilized in medical education and is increasingly used in allied health education is the pedagogical model of problem-based learning. Problem-based learning (PBL) is a theory originally established in 1969 at McMaster University in Canada, in which they described a focus on "critical appraisal skills" and "self-directed learning skills" which learners accomplished using a problem-based learning approach (Neufeld et al., 1989, pp. 423-424). Problem-based learning is defined as "students actively solving a problem as a starting point for student learning" (Nandi et al., 2000, p. 302). Furthermore, it is proposed that PBL increases student self-directed learning capacity, encourages active learning, and the integration of clinical knowledge to practical scenarios, commonly in a multidisciplinary approach (Nandi et al., 2000). This definition was expanded further by Maudsley (1999), in which the author attempted to standardize the definition of problem-based learning. Maudsley identified the main characteristics of problem-based learning, in which the PBL (p. 184):

- Aims at efficient acquisition and structuring of knowledge after working through a progressive framework of problems providing context, relevance, and motivation.
- Builds on prior knowledge, integration, critical thinking, reflection on learning, and enjoyment.
- Achieves its goals via small group work.

Problem-based learning has also been found to be "more stimulating and more humane" and "engaging, difficult, and useful" by students and thus became increasingly popular in medical education since its inception (Nandi et al., 2000, p. 301). According to Neville (2009), students engaged in problem-based learning perform at a higher level compared to those who partake in more "traditional" learning methods. However, its efficacy has demonstrated mixed results, as students undergoing PBL education were found to have improved patient interaction skills, psychosocial capabilities, and interpersonal skills, while those undergoing "traditional" learning approaches performed better in basic science testing (Nandi et al., 2000). Consequently, it was proposed that a combination of PBL and conventional teaching approaches be utilized to optimize learning. These results also revealed that there might be different times in a student's academic growth in which PBL is more effective than others. Students in allied health professions frequently complete introductory science coursework earlier in their educational journey and emphasize psychosocial and patient interaction skills at more advanced levels of coursework. This research implies that PBL may be more effectively integrated into advanced coursework than earlier 'foundational' courses.

While problem-based learning began in physician education, the practice has since expanded into an array of other healthcare disciplines. A meta-analysis completed by Shin and Kim (2013) found that problem-based learning had positive effects on the outcome domains of satisfaction with training, clinical education, and skill courses. It has further been utilized in physical therapy education to help with the concepts of massage therapy, trauma physical therapy, electrotherapy, hydrotherapy, and thermotherapy (Castro-Sanchez et al., 2012). It has also been shown to increase critical reasoning skills in first-year occupational therapy students compared to traditional teaching methods (Scaffa & Wooster, 2004). Importantly, PBL is utilized increasingly in interprofessional education-based activity, including healthcare students from athletic training, physician assistant, and clinical psychology to improve interdisciplinary patient-centered care (Williams et al., 2021).

Problem-based learning can also be adapted to team-based learning methods, which further fosters interprofessional collaboration—a key component to healthcare in the 21st century. Through the introduction of clinically relevant information at specific timepoints with clinical meaningfulness, students are able to demonstrate flexibility and adaptability with the creation and implementation of their care plans. This allows for scenario-based learning to simulate some of the challenges of clinical practice. Furthermore, students' exposure to ever-changing clinical presentations fosters the utilization of evidence-based medicine with the appropriate cueing and reinforcement from faculty members. Varying levels of simulation can provide an avenue for student exposure to constantly changing patient presentations.

Simulation is used extensively in higher education to assist with the clinical decision-making of healthcare students in a low-stakes environment and increasingly in a virtual environment. Simulation with respect to healthcare education is defined as

an array of structured activities that represent actual or potential situations in education and practice and allow participants to develop or enhance knowledge, skills, and attitudes or analyze and respond to realistic situations in a simulated environment or through an unfolding case study (Meakim et al., 2013, p. S10).

The advantages of simulation propose to include the ability for students to receive real-time feedback, adjust the difficulty level based on learning skill, rapid repeatability of clinical skill application, and the ability to personalize the scenario to the learner's requirements (Kim et al., 2016). Prior to, and especially in response to the pandemic, healthcare education accrediting organizations have endorsed the use of simulation as a credible and valuable aspect of clinical education, with varying amounts of simulation being accepted as replacements for traditional in-person clinical experience. Simulation techniques and equipment have frequently been classified as 'high fidelity,' 'medium fidelity,' and 'low fidelity.' Each of these classifications has a distinct purpose and has clear benefits and downsides to its utilization, particularly as it relates to specific pedagogical goals of healthcare students.

Over the last decade, the use of high fidelity simulation (HFS) has rapidly increased in nursing and other healthcare education. High fidelity simulation is defined as "experiences using full-scale computerized patient simulators, virtual reality or standardized patients that are extremely realistic and provide a high level of interactivity and realism for the learner" (Meakim et al., 2013, S. 6). High fidelity simulations allow for students to interact with realistic anatomic structures and interact with computer programs that can provide complex and adaptive responses to the student's clinical decisions. HFS has been shown to be effective in the replacement of traditional clinical placements, as up to a 50% substitution of traditional clinical time with HFS yielding no statistically significant differences in outcomes from those with other more traditional methods of clinical in nursing students (Doolen et al., 2016). Furthermore, it was found that students who participated in 25-50% of clinical placements using HFS had no difference in board certification pass rates compared to students who only participated in traditional clinical placements (Doolen et al., 2016). The synchronous nature and extensive costs associated with HFS can make it difficult to implement throughout a curriculum, and therefore is sometimes used purely as a summative assessment, whereas lower fidelity simulations can be used in a formative manner.

Medium fidelity simulation (MFS) has been defined as

experiences that are more technologically sophisticated such as computer-based self-directed learning systems simulations in which the participant relies on a two-dimensional focused experience to problem solve, perform a skill and make decisions or the use of mannequins more realistic than static low fidelity ones having breath sounds, heart sounds and/or pulses (Meakim et al., 2013, p. S7).

Medium fidelity simulation lacks the adaptability of HFS; typically there is only one' path' for the learner to take because technology cannot deviate in the event of student error. Other types of MFS allow the educator to control the response of the mannequin through the use of a hand-held portable device, in which the instructor can create different outcomes for the learner. While there is a tendency among some to aspire to the highest level of fidelity, the optimal level of fidelity is tied strongly to the learning objectives, and the use of MFS can be appropriate for teaching less experienced learners clinical decision making.

Low fidelity simulation (LFS) has been defined as "experiences such as case studies, role-playing, using partial task trainers or static mannequins to immerse students or professionals in a clinical situation or practice of a specific skill" (Meakim et al., 2013, p. S7). The main drawback to LFS is the lack of realism that is the hallmark of HFS and MFS; however, LFS is frequently more cost-effective for programs with budgetary constraints or those that need to scale to a larger number of students. In addition, there is some evidence that student satisfaction is similar between LFS and HFS activities, including the use of paper and pencil-based simulation (Tosterud et al., 2013). Low fidelity simulation is implemented widely across healthcare educational settings due to the low budgetary requirements, ease of design, and ability to assess simple learning outcomes. The ability to assess a psychomotor skill devoid of context is a hallmark of low fidelity simulation, particularly in the use of 'task-trainers,' which are "specialized models designed to help a learner practice a specific skill" (Singh, 2021, p. 1). Low fidelity simulation provides the flexibility to be administered in both a synchronous and asynchronous manner, which allows for the leveraging of the problem-based learning approach to case study implementation. This is due to the fact that PBL traditionally is a multi-step process that leverages teamwork, and due to conflicting schedules and occupancy capacity, asynchronous activity can mitigate those challenges. Although there is some evidence that LFS is less effective than HFS, it has been theorized that some of those effects may be due to the lack of adequate debriefing following the use of LFS (Kim et al., 2016). Overall, LFS can be effectively used to improve student learning outcomes and has value in the development of clinical skills and clinical reasoning within the context of appropriate and targeted learning objectives.

Overall, to ensure the objectives and outcomes are achieved regardless of the level of simulation, pre-briefing and debriefing should be implemented by the facilitator. Pre-briefing should include an orientation to materials and the setting of the simulation, a basic framework for a collaborative, non-competitive environment, the acknowledgment of feedback implications, the background information pertaining to the scenario, and time for learners to develop a strategy prior to the simulated experience (Franklin et al., 2013). Debriefing is a student-centered reflective process that should be facilitated by a trained observer of the simulation and should be reflective of the objectives and complexity of the given scenario at the conclusion of the simulated experience (Decker et al., 2013). Carefully planned pre-briefing and debriefing sessions provide the facilitator an opportunity to outline clear expectations for the simulated experience and ensure a structure for providing feedback.

One of the consistently cited requirements for effective simulation and problem-based learning pedagogy is the presence of high-quality and timely feedback from various sources. The evidence shows that students who receive feedback, regardless of the delivery method, improve in psychomotor-based and non-technical skills such as teamwork and situational awareness (Levett-Jones & Lapkin, 2014). These feedback mechanisms include a wide array of delivery mechanisms, including post-simulation debriefing, in-simulation debriefing, instructor-facilitated debriefing, and video-assisted instructor debriefing. All debriefing methods were found to be equally effective in the improvement of student outcomes (Levett-Jones & Lapkin, 2014). The delivery method and exact timing of feedback is less important than the fact that feedback was given to students, and accordingly, compels educators to maximize the effectiveness of that feedback.

Feedback has traditionally been classified as one of two primary categories, formative and summative. Summative feedback is defined as,

Information provided by a facilitator regarding aspects of performance that are associated with the assignment of a grade, demonstration of competency, merit pay, promotion, or certification. It usually involves setting of expectations and standards; systematically gathering, analyzing, and interpreting evidence; and using resulting information to document, explain, or improve performance (Meakim et al., 2013, p. S9).

Summative feedback is used extensively and emphasized in the educational system and has become a focus of learners due to its 'high-stakes' nature, as it is used to make decisions regarding progression, competency, and potential certification.

The other primary category of feedback is formative, which is defined as, "information communicated to participants with the intent of modifying thinking or behavior to improve learning and future performance. The feedback should be supportive, timely and specific" (Meakim et al., 2013, p. S6). Formative feedback has increased importance in recent pedagogical research, as it focuses on behavior modification in an environment frequently described as' lower stakes.' This lower-stakes environment may allow students to apply feedback more effectively, as the anxiety associated with summative feedback is alleviated. However, for formative feedback to have maximal efficacy, it must be timely and specific, which has implications for the window of time for educators to achieve the desired behavioral or cognitive outcomes. Overall, the type of feedback provided should be geared to the desired outcome of the simulated experience, regardless of the fidelity of the simulation.

In the setting of higher education, it is commonly accepted that optimal feedback requires three primary conditions. These conditions, as outlined by Nicol and Macfarlane (2006, p. 204), are:

1. The student's knowledge of the standards that need to be applied.
2. The student having to compare those standards to their own work.
3. The student taking action to close the gap between the two.

As noted above, conditions #2 and #3 require students to actively engage and participate in the feedback process for high-quality feedback to occur. Accordingly, it is increasingly important that evaluators be able to communicate in a method that students feel supported and comfortable listening to and integrating feedback into future practice. Trust is repeatedly mentioned in the literature as a foundational component of the implementation of assessment. Lack of trust decreases the likelihood of the student's internalization of constructive feedback (Carless, 2012).

One method increasingly utilized in order to maximize the efficacy of feedback is peer feedback, as it provides substantial educational benefit for students. Rust describes the value of peer tutoring and peer feedback in assessment as used to maximize student growth and development for both the receiver and provider of feedback (Rust, 2007). Furthermore, Topping et al. describe formative peer assessment as "effective in improving the quality of their own subsequent written work and developing other transferable skills" (Topping et al., 2000, p. 163). In addition, they found that students gained not only as the writer receiving peer feedback but also as the reviewer providing the feedback for their classmate (Topping et al., 2000). While students may find the concept of giving and receiving feedback from their peers anxiety-producing, students typically find the experience valuable upon the normalization of the practice from faculty and programmatic-wide adoption of the philosophy.

A challenge with peer feedback and formative assessment is the widely variable quality and quantity of feedback given and received from their classmates, which can lead to resentment and feelings of anger at those who are perceived as providing less valuable feedback (Cartney, 2010). One potential mitigation strategy of this variability of the feedback given and received by students is the use of standardized feedback materials and instructions. These include the use of rubrics, standardized forms, or programmatic expectations that are clearly outlined and modeled by faculty and student mentors. This creates a culture of high-quality feedback being provided and received both from students and faculty members, which decreases the likelihood of a wide variety of quality and quantity of feedback.

One method for standardizing feedback is the concept of "plus/delta debriefing" which stems from cognitive psychology techniques and has been implemented across medical education (Mullan et al., 2014). This technique is used in many different healthcare educational settings due largely to the fact that it requires very little formal training for the feedback provider, allowing for rapid implementation even in peer-feedback settings. The plus/delta debriefing method asks participants to reflect on three main items in order, which allows for participants to think holistically about the experience and action items moving forward. The three items are (Mullan et al., 2014, p. 2334):

1. What happened?
2. What went well (Plus)?
3. What would we do differently (Delta)?

Through the implementation of standardized and high-quality feedback given and received by students, the integration of clinical skills through simulation and problem-based learning can be utilized effectively. Educators, clinicians, and coordinators of clinical education can continue to expand and optimize the use of virtual and simulated clinical experiences even post-pandemic to offer students increased opportunities to integrate clinical skills with low-stakes outcomes. By continuing these novel methods using sound pedagogical practices, healthcare educators can ensure continued growth and readiness of students to integrate into practice with the clinical skills and thought processes needed to function in the increasingly complex medical landscape and foster strategies for lifelong learning.

THE USE OF VIRTUAL PATIENT CASES TO SUPPLEMENT CLINICAL EXPERIENCE

The Effect of COVID-19 On Clinical Education of Health Care Students

The Greek poet, Archilochus, wrote "We do not rise to the level of our expectations, we fall to the level of our training." The expectations of entry-level healthcare professionals may waver; however, our educational training must remain focused on preparing students for the ever-changing landscape of healthcare despite the newly developed challenges. Post-pandemic education must be a blend of past, present, and future innovation to include traditional face-to-face clinical practice, simulation-based education, and technology-driven advancements so that the level of our training continues to prepare students for the world of healthcare. One of the foundational aspects of clinical education is the development of clinical decision-making, which had traditionally been taught using in-person clinical experiences. However, the pandemic has forced education to pivot and adapt into including more novel and innovative methods for the development of clinical decision-making skills through the use of simulation.

The newly changed landscape of clinical education across all disciplines of healthcare as a result of the COVID-19 pandemic created numerous challenges and opportunities to the delivery of clinical education amongst all healthcare professions. This began with the complete elimination of in-person clinical placements for many disciplines due to COVID-19 safety institutional policies. The need to suddenly pivot to alternate methods for clinical education delivery forced educators to examine the use of varying models of simulation as a method for continued student development. While clinical placements resumed in a limited capacity, the need for supplemental clinical exposure further solidified the need for simulation as part of the clinical curriculum.

Subsequent challenges posed by the pandemic include institutional financial burdens, fewer clinical placement opportunities, competition for clinical placement sites based on program saturation and discipline-specific needs, and occupancy limitations of clinical sites. Conversely, healthcare educators have been afforded the opportunity to reinvent the clinical curriculum due to increased flexibility by accrediting bodies. The flexibility by accreditors has opened the door for various levels of simulation-based experiential learning opportunities to supplement the lack of traditional clinical experiences. As with any newly implemented approach, there remain unanswered questions such as the optimal ratio of in-person to simulation-based clinical opportunities.

A major hurdle to navigate in the post-COVID landscape is the substantial financial challenges faced by institutions due to decreased enrollment, shrunken endowments, and the cost of increased student testing and safety protocols (Friga, 2021). This has resulted in budgetary scrutiny, as budget freezes and cuts have affected almost every aspect of the institution. The challenge for educators is compounded by the lack of in-person clinical sites due to COVID-19 occupancy limits and competition between programs and disciplines. However, programs are still expected by administrators and accrediting bodies to provide high-quality clinical education and student preparation while not providing necessary resources to counterbalance the substantial limitations in clinical opportunities. The ability to leverage pedagogically sound practice of simulation in a fiscally responsible manner is therefore essential for the provision of clinical education to maximize learner development, and therefore led many institutions to implement low-fidelity simulation.

SOLUTIONS AND RECOMMENDATIONS

Although in-person simulation laboratories have traditionally been the setting for simulation experiences, COVID-19 has required institutions to be innovative regarding the delivery of the healthcare curriculum. One approach to addressing the challenges presented by the COVID-19 pandemic is the use of an asynchronous, low fidelity, virtual patient case. The foundation of establishing a simulated virtual patient case with a problem-based learning environment requires a keen understanding of the desired learning outcomes. Problem-based learning encourages active participation from the learner and requires students to self-identify gaps in knowledge through authentic cases/problems. The use of process-oriented outcomes such as synthesizing research, collaborating with peers, developing lifelong learners, and clinical reasoning/decision-making skills will allow the students to acquire knowledge in a meaningful context. The specific learning objectives should be case-based or problem-specific and should incorporate previously obtained didactic knowledge.

The use of problem-based learning is centered on small group interactions to work through an unfolding case study. The strategic development of learner groups is the precursor to the development of a problem-based activity. The two primary approaches to group creation within the problem-based system are the use of intracohort and intercohort teams; each approach provides its advantages and disadvantages. Intracohort teams allow the instructor to develop a more focused learning objective, as all learners have the same foundational knowledge and likely approach the problem in a similar manner. Conversely, intercohort teams allow for a diversified foundational knowledge base for a given case, which promotes peer collaboration across learner levels and mentorship throughout the learning process. However, one pitfall with using intercohort teams is the potential for disparate levels of engagement, particularly from the novice level student due to the perceived lack of adequate foundational knowledge for the given case.

One strategy to mitigate the disparate level of engagement from the learner is to develop individual opportunities early in the case inception. The incorporation of an individual response requires students to become active participants in the learning process. Coupled with the use of low-stakes evaluations, the student receives individualized feedback from the facilitator, faculty, or preceptor, thus validating the foundational knowledge needed to engage in team-based learning. While the learning objectives should be consistent for each case/problem, the level of depth and feedback of the individual response should be dictated by the stage of the learner (e.g., Benner's stages); understanding each stage is task-dependent. For example, an advanced beginner learner may be asked to perform a discrete psychomotor skill as a submission, where a proficient learner may be expected to develop a plan of care inclusive of external patient-specific situational factors.

In order to appropriately create team-based objectives, the instructor must appraise the collective level of knowledge and skill of the group within the context of the expected stages of development for the given cohorts. The development of team-based questions should aim to draw on foundational knowledge of all cohorts while encouraging the growth of students from one stage to the next. Regardless of team make-up (intra vs. intercohort) the appropriate appraisal of the learners' development and customization of the learning objectives will allow for optimal student growth through authentic case scenarios.

Once the establishment of teams and objectives have been thoughtfully created for the given cohort(s), the development of authentic cases can begin. The case development process is an opportunity to involve clinical preceptors and other healthcare team members who have not been engaged in clinical activities with students due to the COVID-19 pandemic. Since the efficacy of problem-based learning is predicated on the use of authentic scenarios, clinical preceptors are an optimal source for case development and keeps them engaged in the student learning process. The goal of each case is to contextualize the knowledge base of the learner within the construct of the problem/case. Each case should require the learner to navigate the case through the use of clinical reasoning and decision-making.

Once the decision is made regarding the learning objectives and the specific content area to be addressed, the next decision point is how to appropriately stagger the release of information to optimally challenge and engage the learner in a manner consistent with authentic clinical experience. In accordance with the concept of problem-based learning, multiple information releases should be utilized to simulate the flow of information during clinical care. Each release should correlate with specific learning objective(s) and goal(s). The primary goals for the initial information release should be to allow the student to process the case-related information provided and to display their clinical reasoning and decision-making skills through written or oral responses. Subsequent releases should be aimed at building and clarifying the case presentation, allowing the learner to confirm or identify gaps in their clinical decision-making and foundational knowledge, and simulating the inclusion of additional factors that may change clinical care. Throughout the entirety of the case-based, low fidelity simulation experience, the learner must rely on previous clinical experience and prior knowledge while leveraging appropriate and reputable resources. The key steps to consider in the design of the low fidelity experience should include:

Initial Information Development

Step 1: Determine the amount of information provided on the patient's initial clinical presentation. This information should allow the learner to establish an initial clinical impression with a robust and thoughtful differential diagnosis.
Step 2: Intentionally omit key clinical findings from the initial presentation. This requires the learner to consider what additional information would be valuable in narrowing the differential diagnosis list based on the appropriate stage of learner (e.g., proficient learners may need less information than advanced beginner learners).
Step 3: Strategically identify key context-based factors within the initial presentation (e.g., patient demographics, patient's goals, patient's occupation/level of desired activity, etc.). This allows the student to formulate appropriate initial interventions. This step is particularly appropriate for competent, proficient, and expert learners.
Step 4: Include other desired information based on the identified learning objectives of the scenario (e.g., communication with stakeholders, patient education, legal/ethical concerns, referral to other providers, etc.).

Subsequent Information Development

Step 1: Provide key omitted information from the initial presentation to allow for the learner to confirm the clinical impression and the items they identified as key to narrowing their differential diagnosis list. This can be a key reflective moment for students to self-identify any gaps in their clinical reasoning, decision-making skills, or foundational knowledge.
Step 2: Provide relevant diagnostic information that is consistent with standards of care for the identified pathology (e.g., diagnostic test results, laboratory results, documentation from other providers, etc.) to allow for the student to gain a more comprehensive understanding of the pathology identified in the scenario.

Step 3: Strategically identify any change in key context-based factors within the initial presentation (e.g., patient demographics, patient's goals, patient's occupation/level of desired activity, etc.). This allows the student to modify their interventions as context factors change. This step is particularly appropriate for competent, proficient, and expert learners.
Step 4: Include other desired information based on the identified learning objectives of the scenario (e.g., communication with stakeholders, patient education, legal/ethical concerns, intermediate and long-term goal setting, etc.).

Simultaneous with the development of the information release, targeted questions should encourage the learner to demonstrate the appropriate learning objectives. Questions should be geared towards encouraging reflective, evidence-based, and interprofessional practice with increasing levels of complexity. In addition, learners may be asked to demonstrate relevant psychomotor skills that are associated with the clinical progression of the case. Furthermore, targeted questions allow for students to engage in opportunities not commonly afforded to students in traditional clinical placements. The blending of individual and group-based submissions allows for optimal peer-to-peer engagement. Individual responses require students to challenge and develop their own clinical decision-making schema, while group responses allow for students to challenge their thought processes through learning from both the literature and their classmate's methods. Questions should encourage the learner to illustrate their clinical reasoning within each response. Typical question topics at each stage in the case development process include:

Initial Release Question Topics (Typically Individual Responses)

- Development of a differential diagnosis with specific references to the scenario.
- Identification and reasoning behind key missing items from the initial case presentation.
- Creation of an initial management plan, including immediate and short-term goal development.
- Incorporation of essential non-psychomotor skills (e.g., communication, education of patients or stakeholders, privacy implications, etc.).
- Demonstration of appropriate psychomotor skills needed to provide emergent or immediate care for the patient using synchronous or asynchronous methods, which encourages preceptor involvement.
- Other questions targeting desired objectives based on the initial case presentation and desired goals.

Subsequent Release Questions Topics (Typically Team Responses)

- Interpretation and integration of additional information provided to arrive at a final diagnosis (e.g., diagnostic imaging, laboratory results, consulting provider reports, etc.).
- Evidence-based plan of care considerations (cognitive or psychomotor) including:
    - Prognosis
    - Treatment options (e.g., surgical, non-operative, pharmacological, etc.) including the pros and cons of each approach
    - Rehabilitation plans
    - Expected outcomes

- Discussions regarding reintegration into activities of daily living, including occupation, recreation, and other patient goals.
- Prevention or mitigation strategies to minimize the chance of recurrence.
- Introduction of hypotheticals to challenge the learner's ability to adapt to alternative externalities (e.g., setting, lifespan, socio-economic status, healthcare inequities, etc.).
- Other questions targeting desired objectives based on the subsequent case presentation and desired goals.

All components of the virtual patient case should be derived from an evidence-based perspective. This begins with the instructor's development of the scenario, questions, and feedback provided to the learner. Conversely, learners should utilize the various components of evidence-based practice in the development of their responses. The frequent and consistent use of best practices to justify clinical decisions allows learners to begin to normalize the integration of evidence-based practice into clinical care. An example initial case presentation and associated questions are provided in Figure 1, and subsequent information release and questions are provided in Figure 2. A sample radiology report is provided in Figure 3.

Prior to releasing a virtual patient case, pre-briefing for students outlining the framework of problem-based learning (including the process of dissemination and evaluation) should be provided to the learners within the context of an example case in their respective field of study. Discussions of expectations, timelines, objectives, and goals should be clearly described to the learners to ensure that the learner is focused on the case and not the process. For optimal implementation, all process-oriented items, such as deadlines and information releases, should be consistent from case to case to minimize student confusion and frustration.

Once the questions are developed and deployed to students, the provision of feedback from the instructor and relevant clinical preceptors is critical to ensure optimal growth and learner development. Timely feedback should be provided at each stage in either a synchronous or recorded asynchronous manner to allow for students to incorporate the suggestions into their subsequent submissions. In addition to providing feedback on specific content, the use of reputable sources, best practices, and professional position/consensus statements should be a major area of emphasis. Initial question feedback should be heavily focused on the clinical reasoning of the learner, with less emphasis on 'getting the answer right,' and therefore is an optimal time to employ formative feedback. The use of formative feedback allows for growth in a low-stakes environment, which is consistent with most face-to-face clinical environments. While summative (or high-stakes) may be employed by some educational disciplines, it tends to evoke anxiety from learners, which may hinder the willingness to take risks, thus limiting their growth from a failed experience in a low-risk environment.

Overall, feedback regarding the simulated experience should allow for students to be reflective of the case and their performance, which can be achieved through a debriefing with all relevant stakeholders. This may include faculty, preceptors, mentors, or others involved in the development of the case. Of particular value is the clinical expertise and 'pearls' that more experienced clinicians and educators can offer the student that will impact future clinical practice.

Figure 1. Example initial case presentation and questions

Subjective Information:
Following an incredible season which ended in the NCAA Frozen Four, the goalie on the hockey team presents to the clinic complaining of left hip pain that has been bothering him since midway through the season. He describes the pain as deep and achy, extending from the groin to the lateral aspect of the hip. When asked what provokes the pain, he indicates that his butterfly position has been increasingly difficult and painful. The patient denies any previous history of hip pathologies but did remind you of his incredibly flat feet.

Palpation:
Non-descriptive, general soreness noted during palpation of the hip and groin. No crepitus noted around the greater trochanter. Hypertonicity of the iliopsoas present bilaterally.

AROM:
Hip flexion/extension limited at end range due to increased pain in groin. Hip IR is limited on the left side when compared bilaterally.

PROM:
Limited IR/ER when compared bilaterally with reported sharp pain during IR.

Special Testing:
Did Not Test (DNT) due to a mandatory team meeting.

Functional Assessment:
Patient unable to drop to butterfly position without hesitation.

Initial Questions:

1. At this point, what is your clinical impression (differential diagnosis)?
2. What other items would you like as part of the clinical exam (what's missing?)
3. What action do you want to take (immediate care)?
4. This patient is an NHL prospect with a pro-day this Saturday. What is your recommendation for participation? Be sure to provide a rationale for your decision.
5. Would you refer this patient to another medical provider? If yes, what is the goal of that appointment? If not, why not?
6. A few NHL scouts have requested to talk with you about your patient. What is your communication with them at this point?

Figure 2. Example subsequent information release and questions

As a result of your referral and their clinical assessment, the physician orders an MRI Arthrogram. The radiology report is provided below:

The radiology report outlines the following clinical findings (Figure 3):

Some examples of relevant subsequent questions include:

1. Please provide a monologue informing your patient regarding their condition. Be sure to use terms that they can understand. In addition, be sure to explain and differentiate both types of hip impingement (CAM and Pincer lesions).
2. What are the treatment options for this patient? Which one provides the best long-term outcomes for the patient? Provide citations to defend your answer.

Your patient chooses the treatment option that you outlined as best practice in response #2.

3. What are the return to play criteria you would use for this patient? What thresholds may you implement to ensure the patient has fully recovered?
4. The coaching staff is looking for an update on your athlete's status. Please outline the key takeaways from your discussion with them. Be sure to include projected time lost, limitations upon return to activity, and outline how you may integrate this athlete once cleared to resume athletic activity from their surgeon.
5. How would your initial differential diagnosis change if this patient was 13 years old? What pediatric conditions present with a similar presentation (deep, nondescript hip pain)?

Of substantial financial and logistical benefit is the ability to directly integrate virtual patient cases into the institution's learning management system (LMS). Cases can be programmed using the LMS's adaptive release capabilities to ensure a thoughtful and clinically meaningful release of information and collaboration with classmates through discussion boards. Furthermore, the use of the electronic LMS creates the capacity for facilitators to efficiently collect both individual and group assignments and release individual or group feedback depending on the objectives of the case. LMS software is becoming ubiquitous at institutions of higher education and allows for cost-effective implementation of virtual patient cases.

Figure 3. Example radiology report

PATIENT: Matt Mills
DOB: 12/27/2002
PHYSICIAN: Winston, Brett, MD
EXAM: MRI Arthrogram L Hip
DATE: 10/1/2020

CLINICAL INFORMATION
18-year-old male, assess chronic left hip and groin pain. Hockey Goalie

COMPARISON
None

CONTRAST
Diluted gadolinium (0.1mL in 20mL) in saline

TECHNIQUE
After intraarticular injection of diluted gadolinium in saline, axial T1 fat-sat, axial PD fat-sat, coronal T1 fat-sat, sagittal T1 fat-sat, axial oblique PD fat-sat, and coronal bilateral PD fat-sat images were obtained

FINDINGS
Diluted gadolinium contrast was injected into the patient. There is mild to moderate chondral thinning noted along the peripheral margin of the left acetabulum with linear fluid signal extending into the substance of the acetabular labrum within the anterosuperolateral quadrant suspicious for a small focal linear pattern tear. There is a cam bump noted along the peripheral margin of the left femoral neck. Small hip effusion present. No fracture, stress fracture or AVN of the left femoral head and neck.

The adductors and hamstring tendons are normal. There is mild distal gluteus medius insertional tendinosis. No evidence of iliopsoas or greater trochanteric bursitis. There is soft tissue edema within the left quadratus femoris muscle.

IMPRESSION
1. Findings are suggestive of a cam-type femoroacetabular impingement syndrome of the left hip with a small focal linear pattern tear involving the acetabular labrum within the anterosuperolateral quadrant.

2. There is no fracture, stress fracture or AVN involving the left femoral head and neck.

3. There is soft tissue edema within the quadratus femoris muscles bilaterally. This can be seen with ischiofemoral impingement and clinical correlation is advised.

4. There is mild left gluteus medius insertional tendinosis.

FUTURE RESEARCH DIRECTIONS

While there is good evidence that simulation can be effective in the development of clinical reasoning skills, the pandemic has allowed institutions to become more flexible with their clinical opportunities presented to students. Accreditation agencies have also adjusted their stances on the use of simulation in the fulfillment of clinical requirements, as they have realized the limitations of in-person clinical experiences. Future research should be guided by attempting to determine the optimal ratios of in-person to simulation-based clinical experiences in order to maximize student learning and development. While the COVID-19 pandemic has forced many of these changes in a rapid and emergent basis, examination by educators and researchers on the efficacy of various simulation fidelity models on clinical development is warranted, as many budgetary models do not allow for exclusively high fidelity simulation. This includes, but is not limited to, the areas of clinical reasoning and decision making, critical thinking, and psychomotor skill development.

CONCLUSION

As a result of the COVID-19 pandemic, the delivery and implementation of clinical education have been altered indefinitely. While the transition to alternative forms of clinical education was challenging for students and educators alike, the pandemic has illuminated the use of alternative methods of clinical development, which will persist in the post-pandemic landscape. Educators should consider the optimal method for the delivery of supplemental clinical opportunities while keeping in mind the needs of the entry-level professional. As we look to the future, uncertainty remains with how long the pandemic will alter clinical education as we once knew it. Healthcare educators must continue to seek and develop effective alternatives to deliver clinical education, as many of the aforementioned challenges will persist. Low fidelity simulation using problem-based learning (such as a virtual patient case) can be a cost-effective method to supplement clinical experiences and reinforce the clinical decision-making process.

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KEY TERMS AND DEFINITIONS

Clinical Education: A broad term to describe learning opportunities that prepare students for clinical practice. This can include face-to-face, simulation, or other forms of supplemental learning experiences.

Clinical Reasoning and Decision Making: The process of systematically obtaining and synthesizing key information to determine and provide evidence-based care relative to a specific patient encounter.

Feedback: The provision of information regarding the performance of a specific task.

Fidelity: The realism and interactivity of a technique. This is frequently used to describe simulation types.

Formative Assessment: Feedback that is provided with the primary purpose of a change in the learner's behavior with no specific consequences based on the performance.

Problem-Based Learning: An instructional strategy that requires the learner to actively engage in solving an issue in a progressive manner. This is typically accomplished using small group work and includes the use of prior knowledge and critical thinking to address a complex situation.

Simulation: The intentional emulation of a real-world situation within the context of a particular discipline.

Summative Assessment: Feedback that is provided with the purpose of comparing to a normal value with the intent of making a determination and subsequent consequence based on performance.

Virtual Patient Cases: A low fidelity, asynchronous, problem-based technique which leverages individual and team responses to a simulated clinical scenario.

Chapter 10
Adapting Interprofessional Acute Care Simulations to a Virtual Platform

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ABSTRACT

This chapter addresses the innovative solutions implemented by faculty members at Regis University to pivot simulation experiences to a virtual platform during a global pandemic. Healthcare faculty ensured nursing and pharmacy students actively engaged in content and with one another without sacrificing the necessary interprofessional knowledge. The authors adapted a previously in-person acute care simulation to a virtual platform by utilizing technology and specific, intentional pre-simulation, during simulation, and post-stimulation knowledge checks. By following the standards for interprofessional, nursing, and pharmacy education, the authors were able to execute this simulation and implement meaningful feedback for continued advancement for future students. The continued goal of the simulation will be to provide students with high-stress, low-occurrence acute care patient experiences while working closely with other members of the healthcare team to enable students to experience required, necessary curriculum before graduation and working on the frontlines of healthcare.

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INTRODUCTION

In 2016, faculty recognized a need to match the clinical realities of interprofessional practice experiences to simulation experiences. Therefore, several faculty members created an interprofessional acute care (medical surgical) simulation with a collaborated debrief for nursing and pharmacy students as a part of students' clinical experience. The faculty employed simulation exercises based on cases in Docucare for undergraduate medical surgical nursing students for more than 15 years. In 2020, the COVID-19 pandemic created a sense of urgency to develop virtual experiences for nursing and pharmacy students while following healthcare discipline, interprofessional, and simulation standards. In addition to satisfying accreditation requirements, this simulated experience provided healthcare students with essential experience in collaborating with other healthcare team members prior to graduation in their respective fields of practice. In the academic year of 2020-2021, the acute care (medical surgical) simulations pivoted to a virtual format, in adherence to CDC guidelines on socially distant education, while maintaining accreditation standards and best practices of care. This ensured students continued to participate in interprofessional learning as a part of both the nursing and pharmacy curriculum. The switch from in-person to virtual learning relied on planning, frequent feedback and adaptations to the simulation, as well as dedication from the healthcare faculty.

At the end of this chapter the authors will describe the adaptions and execution of the in-person acute care simulation activities to the virtual/remote learning opportunities. Readers will also review the importance of interprofessional simulation for healthcare students, as supported by accrediting bodies for higher education. In addition, the authors will identify ways to utilize technologies to facilitate virtual simulation activities while incorporating curricular requirements to the virtual environment (e.g. debriefing for meaningful learning, communication skills, healthcare education knowledge specific to discipline).

BACKGROUND

Necessity of Healthcare Simulation

In response to the alarming number of system errors, the Institute of Medicine, an organization that provides authoritative, unbiased advice to decision-makers, recommended fundamental changes in health professions education calling for interprofessional team training (Greiner & Knebel, 2003). In 2009, the Interprofessional Education Collaborative (IPEC) developed interprofessional collaborative competencies to engage students of different professions in interactive learning with each other (IPEC Competencies). Since then, implementation of interprofessional educational (IPE) requirements began to flow into discipline specific accreditation standards. In 2019, the Health Professions Accreditation Collaborative (HPAC) created a guide to formalize interactions across accreditors, and support the development and implementation of quality IPE (HPAC, 2019). During this decade time frame, IPE and the use of simulation became more prevalent in health profession education programs. Literature reviews of interprofessional and simulation education reveal the replicated practice as beneficial in decreasing students' anxiety and increasing skill acquisition, self-confidence, and perception of self-efficacy (Bremner et al., 2008; Jeffries et al., 2003). Simulation can create a risk-free and error-tolerant environment that is similar to clinical settings where students from different professions can learn from, with and about each other to improve teamwork and quality of care. Nursing and pharmacy faculty collaborated to implement advanced IPE acute care simulations for senior nursing and pharmacy students.

Nursing standards, best-practices for simulation, and accreditation requirements are described in detail below, with the pharmacy-education specific details following. The International Nursing Association for Clinical Simulation and Learning (INACSL) developed standards which focus on design, outcomes objectives, facilitation, debriefing, participant evaluation, professional integrity, Sim-IPE, and operations (INACSL, 2016b; INACSL, 2021). Regis integrates these standards throughout the prelicensure curriculum, in both clinical and non-clinical courses. Simulation Interprofessional-Enhanced Education (SIM-IPE) blends simulation instruction and IPE to promote teamwork competencies. Further best practice INACSL standards guide faculty in Sim-IPE by supporting online simulation case studies implementation. These standards state nursing students must be prepared to "cooperate, communicate, and share skills and knowledge appropriately" with other members of the healthcare team (INACSL, 2016b, p. 1). The document points specifically to acute care simulations, that nursing students work with pharmacy students to improve patient outcomes of acutely ill acute care patients (INACSL, 2016b).

In addition to INACSL standards, the *American Association of Colleges of Nursing (ACCN) Baccalaureate Essentials* (AACN, 2008) govern the design and implementation of simulations used in nursing education in these three areas:

- (Essential II) Basic Organizational and Systems Leadership for Quality Care and Patient Safety
- (Essential IV) Information Management and Application of Patient Care Technology
- (Essential VI) Interprofessional Communication and Collaboration for Improving Patient Health Outcomes.

These Association documents assisted faculty in assuring students had opportunities to meet these required baccalaureate essentials, during the in-person simulated experience. The nursing students worked collegially with pharmacy professionals to ensure that the patient received safe and high-quality care. Interprofessional communications centered on administering the right drug therapy at a safe dose, recognizing potential interactions, contraindications and adverse effects, and meeting patient learning needs. A significant outcome of this interaction allowed for each discipline to gain a greater understanding of the other's practice standards and responsibilities (Essential II and VI). Students acquired knowledge and skills by using distinct types of technologies including the electronic medical record provided to them, electronic drug databases, infusion pumps, and cardiac and hemodynamic monitoring systems available in the simulation lab (Essential IV).

The Quality and Safety Education for Nurses (QSEN) project defines the required knowledge, skills, and attitudes (KSAs) needed in prelicensure programs, for five competencies (QSEN Institute, 2020). The five QSEN competencies are patient-centered care, teamwork and collaboration, evidence-based practice, safety, and informatics. These competencies align with the BSN Essentials and improve the quality and safety of patient care where nurses work. The acute care scenarios with medical surgical patients inlay each competency into the experience and requires observable check offs during the enactment. The interprofessional communication strategy practiced between nursing and pharmacy is the SBAR (Situation, Background, Assessment, and Recommendations) tool and interprofessional documentation navigation is held in the electronic medical record (Skill). During the post-simulation debriefing sessions, students have an opportunity to discuss their contributions to the team dynamics and recommend how communication could be improved between the disciplines, to ensure safe, patient-centered care

(Attitude and Knowledge). INACSL recommends including KSAs when writing outcomes and objectives for assessment of the simulation participant's learning (INACSL, 2016c).

The purpose of this simulation for pharmacy has been to expose students to typical acute care disease states, in a manner in which they would appropriately follow the Pharmacist Patient Care Process (PPCP) in real-time (Joint Commission of Pharmacy Practitioners, 2014*).* The specific disease states in the acute care simulation as described in detail later, required students to not only review the appropriate treatment and pharmacotherapy regimens, but also intentionally provide students the opportunity to work with other members of the healthcare team. Learning how to appropriately communicate and function as part of the interprofessional team is the core of this simulation and follows the Center for the Advancement of Pharmacy Education (CAPE) Educational Outcomes (Medina et al., 2013). This patient care ward simulation, utilizing real-world patient simulation, continues to be executed across pharmacy education at large (Bolesta & Chmil, 2014) (Curley et al., 2019). Graduating practice ready pharmacists that are knowledgeable, skillful, and principled, relies on providing these unique opportunities to grow in a controlled learning environment.

In-person simulated learning, which incorporates interprofessional learning opportunities, direct patient care experiences, and high-risk, low-occurrence problem solving, are encouraged by the Accreditation Council of Pharmacy Education (ACPE) as they directly relate to the key-elements of successful, accredited Schools of Pharmacy (ACPE, 2016). High-risk, low-occurrence patient-cases, as described as situations in which patients need more immediate medical attention to prevent emergent, life-threatening conditions yet these occurrences may be limited in opportunity for students to experience, watch, learn, and participate in prior to real-world circumstances. In culmination of Standard 11 of the ACPE guidance, which addresses the necessity and beneficial outcomes of an interprofessional simulation, this simulation is part of the 40-hour (maximum of 60 hour throughout entire curriculum) simulation experiences students complete during their Introduction to Pharmacy Practice Experiences (IPPE) at Regis (ACPE Guidance, 2016). The simulation is incorporated into the curriculum and follows the Integrated Pharmacotherapy sequence so that the disease states and medication-regimens have already been taught. This simulation is required for third-year pharmacy students prior to their Advanced Pharmacy Practice Experiences (APPE) year and Capstone course, to help tie their knowledge to experiential learning that they will experience during their fourth year. Intentional timing of the simulation in the curriculum also ensures that all students have the same experience prior to APPEs in hospital/health system and inpatient acute care required areas. These simulations further solidify pharmacy practice concepts to prepare for real-world, hands-on patient care situations. To further Pharmacist Patient Care Process (PPCP) involvement, students are provided the patient subjective, lab/vital signs, and medication lists to prep for the patient case to mimic rounding and working up a patient by collecting and assessing information, formulating a plan to communicate with the nursing student colleague during the simulation. Research shows simulation continues to be effective and necessary for preparation and success in APPEs (Vyas et al., 2012). Practice-ready pharmacists must continue to repeat PPCP throughout their IPPE and APPE curriculums to solidify learning outcomes while being an active, integral part of the interprofessional team focused on patient-centered care.

Pre-Pandemic, In-Person Simulation Description

Prior to the pandemic, the in-person simulation following the DocuCare cases took place in Regis University's simulation lab. An overview of how the pre-pandemic in-person simulation was conducted will be described; however, more detail on each specific aspect of the simulation will be below when discussing adapting the simulation to a virtual environment.

The simulation lab included high-fidelity mannequins that were voiced by faculty members outside of patient-care rooms. Patient-care rooms were set up similar to a typical hospital patient room, with monitors for vital signs and a computer for documentation. The simulation room included a window so others could look inside the room, but not outside of the room. The rooms are wired to allow conversations to be heard in the room with the door closed by using headphones outside of the room that are connected to the audio feed. Faculty and students could speak into a microphone outside of the room, and students inside of the room could hear them either as voiced by the mannequin as the patient or to provide updated information.

The flow of the in-person simulation was divided into three parts; pre-work for students, in-person simulation execution, and then a debrief with faculty and both student groups together after each student completed all four patient-cases. This simulation flow including the patient cases, is described in detail below.

For nursing students, requirements prior to the simulation included the clinical prep worksheet for one patient scenario, based on information they obtain from the Regis's academic electronic medical record (EMR), DocuCare. (DocuCare, 2021). Student groups consisted of four groups of three or four nursing students that would rotate through the simulation at one time. The pre-work sheets are added to the end of this chapter in Appendix 1 and 2. Prior to the simulation, nursing assignments included a primary (bedside) nurse for each patient, with other nursing students assigned as a secondary nurse, documenting nurse, and/or a caregiver for the patient depending upon the number of nursing students in the group.

The SBAR report serves as a communication tool to handoff essential and timely information about a patient case between healthcare team members (Shahid & Thomas, 2018). The use and practice of communication strategies to improve patient healthcare outcomes is supported in the IPEC document under Communication, CC1: Choose effective communication tools and techniques, including information systems and communication technologies, to facilitate discussions and interactions that enhance team function (Collaborative, I.E., 2016). IPEC guidance was utilized throughout the simulation to ensure that standards were being achieved. Students use data collected from the EMR to understand a SBAR report. For in-person simulations, students received a brief SBAR report from the affiliate nursing faculty at the beginning of each case. In addition, the primary nurse for each case uses SBAR communication to report significant changes in the patient's condition to the healthcare provider over the speaker phone in the patient's room.

For pharmacy students, this acute care simulation is known to be intentionally rigorous in order to ensure exposure to a typical rounding experience of a hospital pharmacist prior to their Advanced Pharmacy Practice Experience (APPE) real-world clinicals their fourth year of pharmacy school. Students are provided each patient's information via the DocuCare information one-week prior to the simulation and are expected to answer disease-state questions (Appendix 2) that are purposely vague to allow students to learn and prep for the simulation without direct guidance to reiterate real-world independent pharmacist practice. Student groups consist of a total of four groups with two to three pharmacy students that rotate through the simulation one patient case at a time, (with nursing students) at a given time. Pharmacy students' assignments include the primary pharmacist, with the secondary pharmacist as back-up on the other patient cases. The primary pharmacist is explicitly informed to review each patient case. Students are told they will be expected to provide the appropriate assessment, plan, and implementation of required and necessary medication interventions to improve the simulated patient scenario to adequately treat their patient, to follow the Pharmacist Patient Care Process (PPCP) model.

During the simulation, the groups of nursing (three to four students) and pharmacy (two to three students) are in the simulation lab together, with nursing students inside the room, faculty outside the room voicing either the mannequin or providing prompting questions, and pharmacy students listening outside of the room. The simulation starts with nursing faculty providing the SBAR, as described above, and then the nursing students enter the room to begin a bedside introduction. The change in condition that occurs is communicated by the patient (mannequin) as voiced by the faculty as well as the nursing and pharmacy students hear the new labs or objective data that changes to indicate the patient has had a change in medical status. Subsequently, the pharmacy students speak with the nursing students outside of the room to come up with a proposed intervention plan to speak with to the faculty. Once the plan is collaboratively finalized, the students speak with faculty (acting as a prescriber or provider) to communicate their intervention. The simulation then ends, and student groups then rotate through the other patient cases in the simulation lab.

After the simulation, students and faculty come together to discuss what went well, needs for improvement, and to further discuss the patient scenarios, following the Debriefing for Meaningful Learning information above. This debriefing is not as extensive, and adaptations were made for the virtual simulation as described later.

The four DocuCare cases included in this simulation followed key diagnosis and patient conditions as evident in both pharmacy and nursing medical surgical curriculum: atrial fibrillation, heart failure with acute kidney injury, pulmonary embolism status-post knee surgery, and alcohol withdrawal syndrome management post-trauma. These four disease states and patient cases include co-morbidities; however, during the simulation, there was an intentional change in patient condition for each patient that nursing and pharmacy students had to recognize the need for a new intervention. The patient cases and subsequent change in condition that required intervention from nursing and pharmacy students is described below in Table 1. These same patient cases, change in condition, and intended intervention were the same in the pre-recorded videos used in the virtual environment as described in greater detail later.

SOLVING THE CHALLENGES OF ADAPTING THE SIMULATION

Initial Adaptions from In-Person to Virtual Environment and Quality Check

The original in-person simulation incorporated interprofessional learning opportunities, direct patient care experiences, and high-risk, low-occurrence learning situations that nursing and pharmacy students would directly encounter upon graduation. Learning through these acute care patient cases exposed students to the key-elements of successful healthcare practice. The transition to virtually learning in the unprecedented COVID time, needed to continue to ensure students remained engaged with these patient care situations, in a controlled learning environment.

Faculty wanted to ensure students reviewed how well a bedside nurse interacted with patients, how patient conditions can change, communication amongst an interprofessional team, and then subsequent interventions when treating patients. To try and re-create the scenarios that the students would have experienced in-person, pre-recorded videos of the simulation were explored. The videos recorded in the simulation lab were to include intentional, explicitly audio describing the simulation. Pre-recorded videos

Table 1. Patient cases, subsequent change in condition, and intended intervention from students

Patient Scenario based on history of present illness given to students prior to simulation	Change in patient condition and how this was communicated or evident to student during simulation	Intended intervention from student
Patient Case 1: atrial fibrillation		
Patient admitted to hospital with symptoms of atrial fibrillation	Appropriate medications titrated. Symptoms of atrial fibrillation continue and vital sign monitor in simulation room provides objective data	Addition of alternative medications and review of guidelines for treatment of atrial fibrillation including rate versus rhythm control and stroke-prevention review. Mannequin counseled on new medications in room.
Patient Case 2: Heart failure with acute kidney injury		
Patient admitted with volume overload and decline in respiratory status	Patient found to be in acute kidney injury, edematous, and with electrolyte imbalances. Vital signs, patient observation, and new lab values provided to prompt students to provide right medication and nursing interventions.	Management of patient at bedside with communication to other healthcare providers, appropriate medication regimen changes (including IV medications for heart failure, management of acute kidney injury, and recognizing interventions for electrolyte abnormalities), and communication with patient with what changes are being made.
Patient Case 3: Pulmonary embolism status-post surgery		
Patient waiting to be discharged after knee surgery in hospital	Patient found to have acute shortness of breath with symptoms and objective data supporting new pulmonary embolism	Management of patient at bedside, anticoagulant interventions, and subsequent calculation of dose of anticoagulant
Patient case 4: Alcohol withdrawal syndrome management post trauma		
Patient with history of alcohol abuse admitted after being hit by a car and found to be intoxicated	Patient begins to exhibit symptoms of alcohol withdrawal, management protocols given to students	Students recognize ideal alcohol withdrawal management to prevent potential life-threatening effects of alcohol withdrawal

utilized affiliate nursing actors to perform patient assessments, interventions, and resolution of acute care problems of the patients in the videos. The pre-recorded videos augmented the clinical reasoning process by having actors offer more verbal descriptions of their thoughts and findings. The actor stated that the simulation was for educational purposes only, so that the simple errors that occurred during the video could be utilized to generate debrief discussions. The decision to video actors performing the simulation allowed faculty to design videos with intense detail, clinical evidence, assessment findings, priority setting, and display of safe medication administration. These scenarios provided the student with a dynamic experience including critical thinking and clinical judgment as the actors voiced their thought processes. Faculty provided comment when performance errors, particularly in communication, occurred when viewing these videos in the virtual class.

Logistical challenges included recording the videos without auditory and visual barriers. The videos had to be re-recorded multiple times, and files had to be converted to appropriate applications on each faculty members' laptop for use during class as not all were back on campus. Additional challenges included determining how much information the bedside nurse should speak, the number of intentional errors or areas of discussion that could arise after viewing the actor nurse's actions in the patient room, and subsequently how communication with the healthcare provider should go. The simulation lab director recorded the videos and edited for a finalized 5-10-minute video. The nurse providers and pharmacists collaborated on the final product. By using a video format, the product could be shared amongst faculty members, and simultaneously viewed by students during the Zoom class format. (Zoom, 2021).

After successfully recording the videos, to meet higher education standards, faculty cross-checked the in-person and virtual simulation to ensure all intended learning objectives and aspects continued to be satisfied. Accreditation standard comparisons are described in Table 2.

Table 2. Standard comparison between in-person and adapted, virtual simulation

Standards	In-Person Simulation	Virtual Simulation
ACPE Standards (ACPE, 2016)		
Standard 11.2 and 11.3. Interprofessional team education and team practice	Students gain understanding of abilities, competencies, and scope of team members through in-person interaction and communication, including simulated experiences	Students gain understanding and learning through nursing student led Situation-Background-Assessment-Recommendation (SBAR) presentations, debriefing as a group on Zoom, and required discussions led by both nursing and pharmacy students
Standard 12.6 IPPE duration	In-person simulation included four acute care patient cases	Virtual simulation used the same, acute care patient cases to ensure exposure to institutional health-system settings
Standard 12.7. Simulation for IPPE	Simulated practice experience did not exceed more than 60 hours (through entire curriculum)	Simulated practice experience did not exceed (in addition to other simulations) more than 60 hours through entire curriculum
CORE INACSL Standards (INACSL, 2021)		
Outcomes and Objectives	Student could meet objectives/outcomes related to patient assessment, medication administration, documentation, and IPE communications, during enactment of case.	Student cannot perform assessment, communicate with other team members, administer medications, document in EHR, or respond to changes in patient situation while viewing pre-recorded video. During debrief session faculty guide discussion on these aspects of patient care.
Facilitation	Simulation and course faculty interact with participants in real time by supplying cues to students.	Students can hear cues in the video that were given to or by the "nurse actor". During debrief, faculty lead discussion on critical events pertinent to each case.
Simulation Interprofessional-Enhanced Education (SIM-IPE)	Nursing and pharmacy students and faculty communicate with each other during the simulation and debrief to discuss patient case, prescribed medications, and correct dosing.	Nurse actors, simulation staff, and nursing students took part in the pre-recorded videos. Students communicate with pharmacy faculty/students only during Zoom debrief.
Professional Integrity	Expected professional and ethical behaviors including confidentiality are emphasized.	Expected professional and ethical behaviors including confidentiality are emphasized.
Participant Evaluation	Mandatory participation with completion of prep sheet and meeting in-person simulation outcomes and objectives during simulation live session as primary nurse.	Mandatory participation with completion of prep sheet and meeting outcomes and objectives during virtual simulation session as primary nurse.
Debriefing	Debriefs held with each nursing student group at end of sim case with affiliate in patient's room. Using the meaningful learning model, pharmacy and nursing groups debrief with faculty after all 4 cases completed for 1.5 hours. Total in-person Sim Time = 2.5 hours	During Zoom, the primary nurse (s) present SBAR report prior to patient case video. Using the meaningful learning model, pharmacy and nursing students debrief immediately following each patient case for 30-40 minutes. Total Zoom Sim Time=4 hours.

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Table 2. Continued

Standards	In-Person Simulation	Virtual Simulation
IPEC Standards (IPEC, 2016)		
VE1: Place the interests of patients and populations at the center of interprofessional healthcare delivery.	Observations of priority setting will be made and shared in debrief session.	Examples of the patient centered care will be discussed at debrief.
VE3: Embrace the cultural diversity and individual differences that characterize patients, populations, and the healthcare team.	Cases intentionally offer cultural variety and students should address any cultural impacts on care team decisions.	The same cases intentionally offered cultural variety, and cultural care delivery will be noted and discussed in debrief.
VE4: Respect the unique cultures, values, roles/ responsibilities, and expertise of other health professions.	Communications with pharmacy and phone conversations with providers will be evaluated at debrief.	Positive feedback and areas for enhanced communication growth will be discussed at debrief.
CC3: Express one's knowledge and opinions to team members involved in patient care with confidence, clarity, and respect, working to ensure common understanding of information and treatment and care decisions.	All verbal and non-verbal communication will be evaluated at debrief. Students should emphasize stellar communication styles.	Positive and areas for communication growth will be discussed at debrief. Suggestions for adaptations to communications witnessed will be discussed at debrief.
CC4: Listen actively and encourage ideas and opinions of other team members.	All verbal and non-verbal communication will be evaluated at debrief. Students should emphasize stellar communication styles.	Examples of active listening and subtle communication styles will be discussed at debrief.
CC5: Give timely, sensitive, instructive feedback to others about their performance on the team, responding respectfully as a team member to feedback from others.	Demonstrate inclusion of the healthcare team in providing care to the patient in each case.	Examples of instructive feedback to others offered or omitted will be discussed during debrief.
TT3: Engage other health professionals—appropriate to the specific care situation—in shared patient-centered problem-solving.	Demonstration of patient centered care will be observed in the case study SIM.	Evidence of team engagement will be discussed in the SIM debrief.

Execution of Virtual Simulation

Early discussions on faculty to student ratios, timing of virtual simulation, and overall flow of the simulation on Zoom included many meetings with faculty prior to initial execution in the Fall 2020 semester. Discussions included logistics of the simulation including potential minor changes to pre-work, how to organize the debriefing, and available faculty members to run the simulation. Faculty cohesively addressed solutions to the potential challenges above with frequent communication via email and meetings on Zoom.

To ensure that students could get a similar experience as in-person, the virtual simulation replicated the process of pre-work, in-simulation execution via Zoom with student participation through watching the pre-recorded videos, and post-simulation debrief.

For pre-work, nursing students were instructed to prep exactly how they would for in-person simulations, using the nursing prep sheet (Appendix 1) and coming prepared to discuss interventions and analyze the actor nurse's interaction and treatment of each patient case. However, the nursing students were notified that they would be presenting the SBAR for the patient cases instead of passively listening to the nursing faculty as what would happen in the in-person simulation. Faculty would assign students roles of primary nurse and secondary nurse, as there was no need for documentation or care giving during the virtual simulation. The primary nurse needed to be prepared to share a detailed and comprehensive SBAR report with all simulation attendees prior to the viewing of the patient scenario. Allowing nursing students to present their report utilizing SBAR in front of the whole student group in Zoom, allowed pharmacy students' to be exposed to interprofessional competencies in communication and support their well-rounded learning prior to APPEs (ACPE 2016; Kostoff et al., 2016). The learning objectives for nursing students was similar to in-person and are described below along with other learning objectives in Table 3.

Similarly, to nursing students, pharmacy students were instructed to prep the same way for the virtual simulation as they would in-person with the same pre-work and disease state questions to answer prior to the simulation to turn-in (Appendix 2). Students were to review the patient-cases and come up with an assessment with interventions and subsequent plan to treat the patient's disease states using evidence-based medicine such as guidelines, tertiary literature, and primary literature as well as books and references available to them during their schooling. There were a few differences for pre-work for the pharmacy students, as in-person simulation reduced patient work-up to only two patient cases per students; however, to increase discussion during the virtual environment and reinforce disease state concepts each student reviewed all four patient cases. Instead of faculty assigning a primary and secondary pharmacist to the patient cases, all students were instructed that using the PPCP they were to work-up all of the patient cases as described above and be prepared to discuss their recommendations for medication interventions. In addition, pharmacy students were notified that during the simulation pharmacotherapy concepts would be reinforced utilizing drug information questions that students would have to answer. The drug information questions as noted in Appendix 3, were sent to students approximately 30 minutes before the simulation as part of the pre-work. Answers to these specific patient questions were to be sent to the pharmacy faculty member via private chat on Zoom. Pharmacy students were notified of this expectation before the simulation as a way to simulate the discussions they would have had in-person amongst themselves and faculty if the simulation was conducted in the simulation lab. The 30-minute leeway was utilized so that students had time to look-up the questions before the simulation, so they could listen during the simulation to the pre-recorded video, but also so that they could experience a limited amount of time to come up with answers specific to a patient case as they would have if this simulation was in-person. Pharmacy students were provided learning objectives that were the same as in-person, specific to the information above.

In addition, to ensure that the interprofessional aspect of the experience was called-out explicitly to students, there were interprofessional learning objectives noted.

All learning objectives are described below in Table 3.

Based on logistics, ultimately there were a total of 15-40 students with a ratio of 1:1 or 1:2-3 pharmacy students to nursing students during the multiple simulations that were conducted virtually. The 15-40 students were with a total of two-three faculty members from nursing and pharmacy for the simulations on Zoom. For execution of the in-simulation activity, all students and faculty joined the same Zoom session and remained in the main session for the simulation entirety. Each simulation with the four different patient cases lasted four hours. Participation expectations for students to receive full credit for the simulation were the following: cameras on the entire simulation, answering questions and/or presenting

Table 3. Interprofessional learning objectives for all learners, pharmacy student, and nursing student learning objectives

Interprofessional Learning Objectives
1. Communicate in a professional and organized manner with other members of the healthcare team; communicate with team members, adapting your own style of communication to the needs of the team and situation. 2. Value the perspectives and expertise of all health team members. 3. Recognize roles and responsibilities of another healthcare profession in an ambulatory care setting. 4. Describe how a variety of members of an interprofessional healthcare team can collaborate to improve patient health outcomes.
Pharmacy Student Learning Objectives
1. Review each patient-case 2. Using PPCP, execute an appropriate assessment with interventions, plan, and monitoring for patient-cases using evidence-based medicine 3. Complete drug-information questions as related to disease states seen in medical surgical patient populations 4. Communicate effectively and professionally with other members of the healthcare team
Nursing Student Learning Objectives 1. Complete the case prep, for your assigned patient, using provided materials 2. Submit a completed prep sheet for your patient case 3. Communicate effectively regarding the patient history, presenting S&S, pathologies, and probable nursing care interventions. 4. Plan to administer all medications correctly 5. Plan the patient assessment, process the meaning of abnormal findings, intervene appropriately, and reassess 6. Identify symptoms and possible outcomes/complications of congestive heart failure, knee arthroplasty, a fib and MVA (motor vehicle accident) 7. Professionally and accurately critique the video of patient care delivery 8. Reflect and share thoughts and experiences during the case debrief 9. Identify one to two clinical practice goals you could employ, for each Simulation case experience

relevant patient case information when called upon, and individual students were called out by name if they had not spoken about their assigned patient case or were not engaged. The Zoom chat feature was not utilized as students were expected to un-mute themselves to communicate with other students to ask questions for open communication even virtually.

During the actual simulation, all faculty and students were introduced to each other, and the overview of the simulation was explained. The nursing students started the simulation by presenting the SBAR for one patient case. The assigned primary and secondary nurses for the patient were called upon and all given a chance to speak about the patient case so that not only was the SBAR comprehensive, but all students participated. The nursing faculty facilitated this patient presentation and answered correlating questions as needed. The next step had faculty share their screen and played the pre-recorded video. At this point, nursing students could watch and point out the actor nurse's successes and opportunities for improvement at bedside, while analyzing the patient's treatment as their condition changed to discuss during the debrief. The change in patient condition was obvious in the video through audio, this included the mannequin being voiced by another actor outside the room speaking through the mannequin, as well as a third actor providing the voice of another healthcare provider speaking their thoughts through the simulation lab microphone system available in the room. In addition, the actor nurse pointing out changes to signs, symptoms, and/or objective lab or test information so students were aware of the progress of the patient. During the video, as described above, pharmacy students were to send the answers to the specific patient-case drug information questions to the pharmacy faculty. The detailed questions are located in Appendix 3. Students who did not answer correctly were given one additional chance for the correct answer to be sent to the pharmacy faculty before the end of the video of the patient-simulation and subsequent debrief. Pharmacy students were able to view how a nurse may interact with a patient at bedside by the actor nurse speaking with the mannequin that was voiced by another actor, while nursing students could understand the relevant medication changes and interventions as discussed by the provider. The provider (third voice as mentioned above) stated the medication interventions heard on the video to the actor nurse.

After viewing the specific videos, which included the intervention made to the patient, the Zoom session concluded with the interprofessional debrief. The students and faculty reviewed each patient case one at a time, before moving on to the next. The strategy used in the debrief is from the research, debrief for meaningful learning (DML) which is a systematic process for debriefing that uses guided reflection to generate new meaning from simulated experiences to foster greater development of clinical reasoning (Dreifuerst, 2009; Dreifuerst, 2012; Tanner, 2006). The DML method of debriefing uses a consistent process involving six components: (a) engage (the participants), (b) explore (options reflecting-in-action), (c) explain (decisions, actions, and alternatives using deduction, induction, and analysis), (d) elaborate (thinking-like-a-nurse and expanding analysis and inferential thinking), (e) evaluate (the experience reflecting-on action), and (f) extend (inferential and analytic thinking, reflecting beyond-action) (Dreifuerst, 2012). Whether in person or virtual the Medical Surgical Simulation uses these 6 components by (a) engaging the participants with typical cases in the Medical Surgical floor, (b) exploring the options the student has either in person in action, or as the students view what past students have done in that scenario, (c) explaining the decision as to why they chose to perform the task in that manner, (d) elaborating in person, verbally, face-to-face or over a virtual platform what the thinking was behind the action, (e) evaluating how their thinking was either accurate or flawed, and (f) as other colleagues professionally and interprofessionally comment on their analysis, extend the understanding as to how others perceive this work and what would be best in future scenarios. This intentional method of reflection supports students' ability to translate their thinking into actionable knowledge that can be used in future clinical encounters (Dreifuerst, 2009). Although the format and process of debriefing can vary considerably, it is common for professors and students to review what went right, what went wrong, and what should be done differently in the future (Dreifuerst, 2009; Dreifuerst, 2012).

In this acute care simulation, DML consists of faculty facilitating the discussion, while students dictate the conversation, questions, and then subsequent reflection on how the simulated nurse and pharmacy team managed the patient situation, while analyzing the subsequent intervention as communicated by a provider. During the debrief, students interact with each other, ask questions about their disciplines and management of patients, as well as learn information about what specifically each healthcare provider is focused on when caring for patients when these high-risk, low-occurrence situations occur. The assigned primary bedside nurse group reflect on key problems, desired outcomes, intervention, process evaluation, and lessons learned while the pharmacy students relay their preferred interventions, evidence-based reasoning, and appropriate follow-up in a manner that is appropriate for interprofessional communication.

After the discussions and debriefing for all patients concluded, students were asked to fill out the post-simulation survey.

An abbreviated overview of the adaptation, challenges, solutions, and subsequent execution of the in-person to virtual simulation is described in Table 4.

Table 4. Adaptations made to the in-person simulation for virtual environment

In-person simulation activity	Potential Challenges to Virtual	Potential Solutions	Virtual simulation execution
Introducing the patient case via nursing faculty presentation	Pre-recorded video did not include actor nurse introducing patient	Ensure student participation from beginning to end of sim	Nursing students communicated SBAR for each patient, each nurse assigned to patient had to speak
Bedside interaction, responsibilities, and working with mannequin for hands-on learning including changes to patient condition	Passive learning if watching video, FERPA challenges if faculty used previous student simulations that were recorded	Actor nurse pre-recorded videos with intentional, explicit dialogue and specific actions when treating the patient that may be wrong or right	Pre-recorded videos provided opportunity for debriefing and discussion. Although passive, the intentional dialogue and action could be recognized and analyzed by students
Medication intervention discussions amongst pharmacy students	Students need to work-up and recognize potential interventions using evidence-based medicine besides just completing the pre-work	Drug information questions	Drug information questions created and tailored to mimic the discussions pharmacy students would have had in person
Interprofessional communication	Difficult to recreate entire simulation online	Debriefing with all nursing and pharmacy students together	Following DML, students had to unmute themselves to discuss the pre-recorded videos with other students
Debriefing the individual patient cases and subsequent action of bedside nurse and pharmacist	Difficult to recreate hands-on action and fluid discussion that would occur naturally in person	Zoom session with prompted questions based on actor nurse intentionality and drug information questions posed to students	DML still achieved via the Zoom session with active engagement from students based on intentional faculty changes made to sim as described above

SOLUTIONS AND RECOMMENDATIONS

Post-Simulation Assessment and Impacts

Years of successful IPE simulations in the classroom-lab setting framed the conversion of the in-person activity to a virtual simulation platform. Knowledge, experience and debriefing outcomes guided the plan to capture the exercise virtually.

In preparation for the platform change, faculty acknowledged that the adaptation would result in less active roles for students and subsequent loss of skills demonstration. To offset this reality, students would write during the debrief their evaluation of the observed care and priorities of the healthcare provider in the video. Equally, medication delivery process, while well covered verbally, could not be experienced by students during virtual simulation. Faculty realized there would be some limitations to the virtual format when working in a hands-on field like healthcare. IPE engagement could be achieved online during the debrief using Socratic questioning and dialogue between the two disciplines, yet one could argue limitations of self-reflection occur when students do not actively participate in the simulated experience, despite high-level critiques of these scenarios (Dreifuerst, 2015). Obvious limitations occur in virtual simulations delivered remotely when compared to in-person, real-world experiences. However, this simulation helped retain the otherwise lost, meaningful curricular content of intentional student communication skills practice, knowledge checks, and interprofessional experience. The execution of converting this simulation to a virtual platform provided essential curricular elements for students prior to graduation who will soon be working on the much needed frontlines of healthcare.

Although the execution of this virtual simulation was well received by students and faculty, there are challenges and adaptations from the in-person simulation that could not be replicated. Faculty acknowledged that students would lose the hands-on experience of working with mannequins, as well as the face-to-face discussions with students of different disciplines. However, adapting the simulation to enable discussion and dialect amongst the students in the Zoom session helped promote engagement amongst students, even in a more passive learning environment with virtual learning.

Feedback from the faculty revealed that despite the typical critiques of large group virtual learning environments as being disruptive to conversations, all debriefs successfully integrated the interprofessional aspect of the simulations. The faculty to student ratios did not appear to affect the discussions amongst students, one faculty per 15 students, if faculty facilitated the discussions and kept the conversations on track.

In the future, allowing for pausing of the pre-recorded video after the condition change for each patient case could occur. This would allow students to ask questions amongst each other of what interventions would they make, how well they understood the nursing expectations and subsequent pharmacy interventions, and allow for more engagement without waiting for the entire video to end. However, there are limitations for frequent pauses during the Zoom event. This simulation spanned over a total of four hours, although with small five-minute breaks, and faculty did not want the students to lose the meaningful learning and knowledge that came from debriefing each patient case by extending the simulation. The use of break-out rooms in Zoom was not discussed in depth as logistically there were not enough nursing or pharmacy faculty that were able to facilitate a patient case video to allow for smaller groups during the actual simulation video. Faculty recognize break-out rooms may minimize the large groups and length of the simulation; however, logistically this is not feasible for Regis.

To gauge how students viewed the newly incorporated simulation, a survey was created to obtain students' overall thoughts on the simulation. The survey consisted of three open ended qualitative questions:

1. What went well?
2. What improvements would you recommend for the future?
3. What did you learn from this simulation?

Students volunteered to complete the electronic survey via CongitoForms®. Survey completion rate was 65% (69/106), and the qualitative answers revealed several themes. When asked "What did you learn from this simulation," the majority of respondents, 95.6% (66/69), reported the experience as a positive learning activity where they further discovered the responsibilities of both pharmacy and nursing professional roles. A random sample of additional survey responses, in addition to those described below, continue in Appendix 4. Personal quotes from the students included, "I liked hearing the different though [sic] processes that go into caring for this patient. I think it was a really good balance between Pharmacy and Nursing,' and 'I loved that it was interprofessional. It felt more realistic.'

The students reported learning several practical skills despite the format including but not limited to dosing, value of interprofessional relationships, patient assessments typically seen in Medical Surgical Units, and valuing a team approach. Comments from one respondent included, "I learned that it's important to use dosing that is helpful for nurses. For example, pharmacy doses heparin in units, but RNs will administer heparin in mL It is also important to know why certain labs are ordered, especially if it is a frequent blood draw." Another noted that "The inter-professional relationship between the nurse and the pharmacist of the hospital will be very important in my future career. They can be very helpful when patients are on a plethora of medications and I am considered with potential interactions, particularly if administered simultaneously. I appreciated seeing the roles of both professionals interact with different patients, for example the comparison between the alcoholic patient with seizures and the elderly heart failure patient".

In addition to this qualitative assessment, pharmacy students also completed a post-simulation timed quiz as a knowledge check. This requirement is consistent with the in-person simulation expectations. The quiz included questions around typical disease state physiology, drug information questions answered during the simulation, and questions to gauge the knowledge base of students. For the virtual event, students scored an average of 91% on the post-simulation quiz and reflected that the acute care simulation helped reinforce concepts before their capstone course in the curriculum. The average quiz score from the most recent past year of students who completed the in-person simulation was 92%.

FUTURE RESEARCH DIRECTIONS

Previous researchers have categorized outcomes in IPE which modified into a six-step process categorization beginning with the learner's initial reaction and progressing to skill development, which ultimately benefits the patients/clients in the healthcare workers care (Craig & Bittel, 1967; Freeth et al., 2005). The aim of this simulation, from an interprofessional education standpoint, is to further develop both acute care discipline specific knowledge and interprofessional communication skills. For the school of nursing, the use of simulation and skills laboratories spreads liberally throughout the curriculum. This acute care simulation is placed at the end of the course of study, prior to the complex Capstone course, which closes the student clinical experiences. The nursing students have 96 hours of direct patient care included in the same course as this four-hour simulation.

Future work could more clearly outline the interprofessional curriculum at Regis and align it with the six-step process identified by researchers Craig and Bittel (1967), and progressed by Freeth et al. (2005). Further research could track the nursing student's clinical performance with IPE rounds, team work on patient care issues with clinical pharmacists, or evaluate student responses to real clinical changes in patients seen in the simulation experience, specifically those with rapid atrial fibrillation, withdrawal from alcohol, pulmonary emboli, or heart failure.

The School of Pharmacy continues to enhance post-simulation quiz knowledge check questions, revisit drug information question difficulty, and assess best timing of drug information in pre-simulation materials. After each simulation, a 30-minute pharmacy specific debrief occurs for open-ended feedback regarding the simulation that was not quantified or captured during the interprofessional survey.

From the students' perspective, they shared small-scale opportunities of improvement such as increasing video volume and returning the simulation to in-person once the pandemic was over. Additionally, following recommendations by Gaba (2004), enhancing the methodological rigor in study design and outcomes assessment would also be helpful. Finally, the popularity of employing the virtual learning environment for meaningful content discussions may wean after herd immunity and will need to be reevaluated once in person learning can return.

CONCLUSION

Despite challenges caused by the COVID-19 pandemic, it remains essential, now more than ever, that healthcare educators remain dedicated to providing students essential curricular knowledge, and experience in their respective fields of practice prior to graduation. Adapting this interprofessional simulation to a virtual platform maintained the beneficial and fruitful aspects of the event, which originally included SBAR communication, drug information question practice, interprofessional conversations, meaningful debriefing, and open discussions on critically analyzing tasks. Despite the change in platform, using post-experience reflections for clinical performance evaluations remained a mainstay. The use of assessments such as feedback, surveys, comments, and examinations as utilized in this adaptation of acute care simulations, shows that remote learning can be beneficial, crucial, and in accordance with accreditation standards to meet students' needs. As in-person activities remain a rarity, healthcare educators must ensure that virtual learning continues to provide students with the required knowledge and experiences as expected during their education.

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KEY TERMS AND DEFINITIONS

ACPE: The Accreditation Council for Pharmacy Education accredits Schools of Pharmacy across the United States based on standards developed and maintained to graduate practice-ready pharmacists.

Acute Care: Care in an institutional/hospital setting for patients with immediate, urgent medical needs.

Debrief for Meaningful Learning: A process used in simulation labs to help nursing students "think like a nurse." Using questioning, analysis and nursing process/clinical judgment models, the students refine their clinical judgment, and reflective thinking.

INACSL: The International Association for Clinical Simulation and Learning defined outcomes and objectives for Simulation. Goals setting, facilitation, methodology, and debriefing.

Interprofessional Education: Opportunities within the curriculum for students to have intentional, dedicated sessions to learn from and with other healthcare providers to prepare for real-world experiences working with interdisciplinary teams for patient care.

IPEC: The Interprofessional Education Collaborative supports interprofessional learning amongst schools of healthcare education to encourage, unite, and promote interprofessional experiences by utilizing core values to ensure graduates are competent working with others fin patient-centered care.

PPCP: The Pharmacist Patient Care Process unifies pharmacists with the consistent approach to provide patient-centered, evidence-based care with interventions tailored to the desired outcome of the patient(s) while working collaboratively with other healthcare provides.

Simulation: Specific, designed scenario to ensure student exposure to an intentional, real-world high intensity situation in a controlled environment for the purpose of achieving defined learning objectives in an experience that otherwise may not occur.

Simulation Preparation Nursing: The process, curriculum, and material utilized to ensure nursing students are ready to actively engage, participate and communicate during the experience by reviewing disease-states, learning objectives, and expectations.

Simulation Preparation Pharmacy: The process, curriculum, and material utilized to ensure pharmacy students are ready to actively engage, participate and communicate during the experience by reviewing disease-states, learning objectives, and expectations.

Virtual Learning: Curricular requirements delivered to students via remote technologies with audio and video capabilities for active engagement to supplement or replace in-person teaching.

APPENDIX 1

Nursing Prep Sheet for Simulation

NR464 Virtual ONLINE Adult II Simulation

STUDENT INFORMATION AND PREP SHEET for ONLINE SIMULATION EXPERIENCES

Prep sheets are due in the World Class Assignments tab BEFORE the Virtual Online Simulation begins. See Course Calendar for the exact date.

NR464 Scenario Judy Santolouco with Total Knee Arthroplasty Prep Sheet

Name: Judy Santolouco MRN: PCS80031 Room: 225C Gender:
Age: Weight: Allergies:
Primary diagnosis:
Diet: Activity:
Code status:

She was admitted to the floor post op day 0. Today is post op day 2. We have been planning for discharge today.

Table 5. List admission lab values and most current lab values:

Lab /Diagnostic	Yesterday 0700 (put value then H for high or L for low next to each value)	Norms
Hemoglobin		14-18 g/dL male 12-16 g/dL female
Hematocrit		42-52% male 37-47% female

Table 6. GENERAL LAB KNOWLEDGE:

Lab /Diagnostic	Normal Range	Significance/Meaning of this test
ABG: (Arterial Blood Gas) pH		
ABG: PO2		
ABG: PCO2		
ABG: HCO3		
D-dimer		
PT		
INR		
Troponin		

Which lab is used to determine therapeutic level of enoxaparin? Heparin? Coumadin?

Table 7.

Vital Signs	First set of vitals	Most recent	Current (fill out during sim)	Norms
BP				
HR				
RR				
Temp				
O_2 Sat				

Look through your physician's orders from admissions through today.
Look at your prn meds.
What medication is available for pain?
What is available for nausea?
What meds are available for constipation? How would you decide which one to select?
Complete the medication table below including adding in the trade name

Table 8.

Name of Drug – Generic and Trade Name	Drug Classification	Dose	Route	Time	Major SEs / Interactions	Reason for receiving	Assessments Before Administering
enoxaparin							
docusate							
celecoxib							
magnesium citrate							
Bisacodyl							
ondansetron							
Morphine hydrochloride							

Discuss / Explain: (use the stethoscope icon in Docucare to assist you in answering this section)

a) Pathophysiology of patient's major disease:
b) The usual medical treatment for this disorder; Include surgeries, medications, and treatments.
c) Significant diagnostic tests (labs, x-rays) used to assess, monitor progress.

Assessments Planned: (What would you assess to evaluate the effectiveness of medical and nursing care?) (What complications would you monitor for?

APPENDIX 2

Pharmacy Pre-Simulation Prep Sheet and Questions:

Heart failure and MVA Questions

1. How do we dose furosemide in heart failure? How is it administered? How do we monitor efficacy and safety of furosemide?
2. Which medications used for heart failure can cause hyperkalemia? How do we pharmacologically manage hyperkalemia (make sure you know dosing of pharmacologic interventions)?
3. What are the treatment options for alcohol withdrawal? How do we select therapy in patients with liver dysfunction?
4. What are signs and symptoms of alcohol withdrawal?

Knee surgery and Afib

1. What are the acute treatment therapies for new onset atrial fibrillation?
2. What are the goals of treatment for atrial fibrillation? What heart rate goal do we target? What is the most common complication of atrial fibrillation and how do we reduce the risk of that complication? (hint: there is a scoring system to determine risk and appropriate pharmacologic prevention)
3. What are most likely complications of knee surgery in hospitalized patients? How do we reduce the risk of this complication?
4. What is the most appropriate treatment for DVT/PE in patients with chronic kidney disease?

APPENDIX 3

Pharmacy Drug Information Questions – Virtual Simulation Only

Patient 1: TKA subsequent DVT then PE

1. What anticoagulant(s) do you use to treat a PE?
2. What is the CrCl cut off for lovenox?
3. What is the correct dose of UFH (heparin IV) for acute treatment of a PE? Bolus and drip?
4. What lab values do you need to monitor for UFH? INR is wrong.
5. Safety lab values?

Patient 2: HF

1. What is the K level? Is that within range or not? What medication (not IV calcium gluconate) would you use (PO medication) is used to decrease K?
2. What are the consequences of hyperkalemia?
3. What meds is she on that increase K? What would you stop or d/c with her high K?
4. What is the cause of the AKI? Post-renal vs. Pre-renal?
5. Would you increase her Lasix? To what dose?

6. What is the safety lab value to check for Lasix? What is the efficacy value/measurement to check to see if Lasix is working?
7. What inhaled medication would you use for a patient who is short of breath but is tachycardic? Think other formulations of albuterol?

Patient 3: alcohol withdrawal

1. What is in a banana bag?
2. Why is thiamine in the banana bag? What disease state does thiamine prevent/treat in alcoholics?
3. What are the LOT benzodiazepine drugs? What makes them different?
4. What liver lab values are abnormal?
5. Would you use diazepam or would you switch to a LOT drug? Which LOT drug?
6. What happens if you use too many benzos? What side effects?
7. You will get asked if you can give Ativan IV at the same time/in the same IV line as a banana bag. What reference would you use to check IV compatibility?

Patient 4: afib

1. In afib we want to anticoagulated to prevent stroke, then use rate vs. rhythm control. NOT both rate AND rhythm control initially. Is amiodarone for rate or rhythm control?
2. If you cannot give an IV beta-blocker on this floor, what medication would you use to help this patient's afib? Keep in mind her PO beta-blocker is at maximum dose?
3. What are the counseling points for the PO medication you chose?
4. What is the heart rate goal of SYMPTOMATIC afib? What about asymptomatic afib?
5. Why do we give patients anticoagulants for afib?
6. What is this patient's CHADS2-VASc score?
7. This patient's CHADS2-VASc score means she COULD start on aspirin, but also could be on nothing. What guidelines would you look at to double-check?

APPENDIX 4

Interprofessional Survey Sample Results, Personal Quotes

The qualitative response below represent a portion of the survey responses in addition to those described in the chapter. In the degree column, PharmD represents pharmacy students and BSN represents nursing student's responses.

Table 9.

Participant Number	Degree	What went well in the Med-Surg SIM?	What are the opportunities for the event?	What did you learn that you will incorporate in your practice?
69	BSN	I like having Prep sheet done before SIM, SBAR report, videos, interactive questions which are practical and could be used in our nursing practice, and being with the pharmacy team	I hope that the volumes used in the video are louder and clearer. I have challenges with listening to the audios during the SIM	I have learned a lot of practical things that will help me in my nursing practice. I also learned a lot from the pharmacy instructor.
68	BSN	The time to brainstorm and discuss in a collaborative environment without the rushing of acting in an actual sim environment where time feels more limited, rushed, and it feels very artificial. Also appreciated being able to see multiple scenarios instead of just one.	Nothing comes to mind. I honestly found this format of a simulation more valuable than previous ones I have participated in as an acting nurse.	Many things...more about the role and scope and standards of pharmacists; more information about med rationales; more about tools and skills to reinforce in my own practice; more about the qualities of a good nurse.
67	PharmD	I enjoyed the recorded videos in order to get a more real-life scenario.	More directed questions to specific students.	The important role that nurses play in the healthcare team!
66	BSN	I liked hearing the different though processes that go into caring for this patient. I think it was a really good balance between Pharm and Nursing.	I think more structure would be helpful in this SIM. We bounced around a lot and it was hard to follow sometimes.	I learned a lot about what Pharmacists do and I have a new-found respect for them!
65	PharmD	I loved that it was interprofessional. It felt more realistic.	I think the SIM could be better if more students participated. I know there were several pharmacy students (and likely nursing students), that did not speak at all.	I learned that it’s important to use dosing that is helpful for RNs. For example, pharmacy doses heparin in units, but RNs will administer heparin in mL. It is also important to know why certain labs are ordered, especially if it is a frequent blood draw.
64	BSN	The questions posed by the joint faculty were fabulous and stimulated critical thinking and a more thorough understanding of the course material. It was an incredible opportunity to witness how the two specialties are different despite being within the field of medicine. I also was appreciative of the breaks that were provided after each case because it allowed me to reflect on the previous patient and refocus before moving onto the next.	Honestly this SIM was fabulous and I enjoyed working through all four cases on a group but focusing on one to submit the report so that we can contribute as individuals to the group discussion. I was disappointed to not have the opportunity to do this in person, but honestly, I feel that this was a richer experience in the long run because we had so many different minds working through the cases and seeing it through a different lens. I apologize for not having any further recommendations.	The inter-professional relationship between the nurse and the pharmacist of the hospital will be very important in my future career. They can be very helpful when patients are on a plethora of medications and I am considered with potential interactions, particularly if administered simultaneously. I appreciated seeing the roles of both professionals interact with different patients, for example the comparison between the alcoholic patient with seizures and the elderly heart failure patient.
63	BSN	I liked how the SIM was basically an open conversation, I thought both the nursing and pharm professors provided good guided questions to facilitate conversation.	I would honestly have less cases, maybe only 2 or 3, and have all the students prep on all cases. I tended to hyper focus on the case I was assigned, and found myself zoning out during other cases.	I learned how the pharmacy employees/students work! and how we can interact in clinical practice. it was interesting to learn about their scope, and how we can utilize them in practice.

APPENDIX 5

Interprofessional Standards and Competencies (IPEC 2016),

Values/Ethics Competencies:

VE1. Place the interests of patients and populations at the center of interprofessional healthcare delivery.
VE2. Respect the dignity and privacy of patients while maintaining confidentiality in the delivery of team-based care.
VE3. Embrace the cultural diversity and individual differences that characterize patients, populations, and the healthcare team.
VE4. Respect the unique cultures, values, roles/responsibilities, and expertise of other health professions.
VE5. Work in cooperation with those who receive care, those who provide care, and others who contribute to or support the delivery of prevention and health services.
VE6. Develop a trusting relationship with patients, families, and other team members (CIHC, 2010).
VE7. Demonstrate high standards of ethical conduct and quality of care in one's contributions to team-based care.
VE8. Manage ethical dilemmas specific to interprofessional patient/ population centered care situations.
VE9. Act with honesty and integrity in relationships with patients, families, and other team members.
VE10. Maintain competence in one's own profession appropriate to scope of practice.

Roles/Responsibilities Competencies:

RR1. Communicate one's roles and responsibilities clearly to patients, families, and other professionals.
RR2. Recognize one's limitations in skills, knowledge, and abilities.
RR3. Engage diverse healthcare professionals who complement one's own professional expertise, as well as associated resources, to develop strategies to meet specific patient care needs.
RR4. Explain the roles and responsibilities of other care providers and how the team works together to provide care.
RR5. Use the full scope of knowledge, skills, and abilities of available health professionals and healthcare workers to provide care that is safe, timely, efficient, effective, and equitable.
RR6. Communicate with team members to clarify each member's responsibility in executing components of a treatment plan or public health intervention.
RR7. Forge interdependent relationships with other professions to improve care and advance learning.
RR8. Engage in continuous professional and interprofessional development to enhance team performance.
RR9. Use unique and complementary abilities of all members of the team to optimize patient care.

Communication Competencies:

CC1. Choose effective communication tools and techniques, including information systems and communication technologies, to facilitate discussions and interactions that enhance team function.
CC2. Organize and communicate information with patients, families, and healthcare team members in a form that is understandable, avoiding discipline-specific terminology when possible.

CC3. Express one's knowledge and opinions to team members involved in patient care with confidence, clarity, and respect, working to ensure common understanding of information and treatment and care decisions.
CC4. Listen actively, and encourage ideas and opinions of other team members.
CC5. Give timely, sensitive, instructive feedback to others about their performance on the team, responding respectfully as a team member to feedback from others.
CC6. Use respectful language appropriate for a given difficult situation, crucial conversation, or interprofessional conflict.
CC7. Recognize how one's own uniqueness, including experience level, expertise, culture, power, and hierarchy within the healthcare team, contributes to effective communication, conflict resolution, and positive interprofessional working relationships (University of Toronto, 2008).
CC8. Communicate consistently the importance of teamwork in patient centered and community-focused care.

Team and Teamwork Competencies:

TT1. Describe the process of team development and the roles and practices of effective teams.
TT2. Develop consensus on the ethical principles to guide all aspects of patient care and team work.
TT3. Engage other health professionals—appropriate to the specific care situation—in shared patient-centered problem-solving.
TT4. Integrate the knowledge and experience of other professions— appropriate to the specific care situation—to inform care decisions, while respecting patient and community values and priorities/preferences for care.
TT5. Apply leadership practices that support collaborative practice and team effectiveness.
TT6. Engage self and others to constructively manage disagreements about values, roles, goals, and actions that arise among healthcare professionals and with patients and families.
TT7. Share accountability with other professions, patients, and communities for outcomes relevant to prevention and healthcare.
TT8. Reflect on individual and team performance for individual, as well as team, performance improvement.
TT9. Use process improvement strategies to increase the effectiveness of interprofessional teamwork and team-based care.
TT10. Use available evidence to inform effective teamwork and team-based practices.
TT11. Perform effectively on teams and in different team roles in a variety of settings.

Chapter 11
Innovative Adaptation of Training and Technical Assistance:
Education for the Behavioral Health Workforce

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ABSTRACT

The behavioral health workforce is pivotal to provide evidence-based services (EBPs) for patients with mental illnesses or substance use disorders. The COVID-19 pandemic has exacerbated existing healthcare issues for these patients and highlighted the need for a well-trained workforce. The stay-at-home orders compelled a rapid transition to delivering behavioral health services from traditional face-to-face encounters to telehealth/telecommunication services. Training and technical assistance (TTA) networks supporting the behavioral health workforce's educational needs quickly moved to virtual delivery. This shift has resulted in innovations and adaptations categorized into four areas: adapting is crucial, convening stakeholders is essential, resources (human and technological) are needed, and community involvement is integral. Future TTA efforts should focus on sharing the successful virtual adaptations to EBPs.

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INTRODUCTION

Behavioral health workforce refers to the group of practitioners that work to prevent or treat people with a mental illness or substance use disorder. It is an interprofessional group of practitioners including doctors, nurses, social workers, addiction counselors, psychologists, pre-professional graduate students, as well as people with "lived experience" such as peer recovery support specialists and prevention specialists. The behavioral health workforce plays a pivotal role in ensuring people across the U.S. have access to essential mental health and substance use services. "Substance use is the use—even one time—of any psychoactive compounds (substances) with the potential to cause health and social problems" (Office of the Surgeon General, 2016, p. 1–4). Substances are categorized as alcohol (e.g., beer, wine, and liquor); illicit drugs (e.g., cocaine and heroin); prescription medications that are used for nonmedical purposes (e.g., pain relievers) and over-the-counter drugs or other substances (e.g., cough and cold medicines and inhalants). A "substance use disorder (SUD) is the repeated, regular misuse of any of the substances that may lead to the development of a substance use disorder" (Office of the Surgeon General, 2016, pp. 1–4).

The COVID-19 pandemic has exacerbated existing issues of mental health and substance use disorders and highlighted the need for a strong, resilient, and well-trained workforce. Forty-four million American adults have a diagnosable mental health condition (Mental Health America, 2021). Globally, an estimated 35.6 million people suffer from substance use disorders (Office on Drugs and Crime, 2020). The onset of the pandemic and the subsequent economic recession have negatively affected people's mental health, creating new barriers for people already suffering from mental illnesses and substance use disorders (Panchal et al., 2020; Wang et al., 2020).

The pandemic presents an unprecedented set of challenges for a field that is already stressed. A key factor in building a robust behavioral health workforce is the availability and accessibility of federally funded *training and technical assistance* (TTA). TTA refers to "the planning, development, and delivery of activities designed to achieve specific learning objectives, resolve problems, and foster the application of innovative approaches" and to "develop and strengthen the specialized behavioral healthcare and primary healthcare workforce that provides substance use disorder treatment and recovery support services" (Bureau of Justice Assistance, n.d., para. 1; Substance Abuse and Mental Health Services Administration [SAMHSA], 2017).

The University of Missouri–Kansas City (UMKC) has been the parent organization for innovative federally funded TTA grants for the past 27 years. The Collaborative to Advance Health Services (CAHS) is composed of a cadre of interprofessional staff from the fields of nursing, social work, education, public health, pharmacy, business administration, and other fields. The mission of CAHS is to "advance health and wellness by bringing research to practice, supporting organizations through change processes and providing high quality training and technical assistance to the health workforce" (CAHS, 2019, para. 1). CAHS has led several national and international training and technical assistance networks. These networks' goals are to provide high-quality, evidence-based training and technical assistance to interprofessional audiences in the health and behavioral health fields.

This chapter describes the training and educational practices employed by CAHS to develop and implement national and international TTA networks. Specifically, the chapter aims to cover a broad range of concepts and topics and to achieve the following objectives:

1. Describe the educational needs of the behavioral health care workforce before and following the COVID-19 pandemic.

2. Describe the field of substance use prevention, early intervention, treatment, and recovery audiences and how they learn in interprofessional virtual environments.
3. Describe how to adapt training of *evidence-based practices* (EBPs), such as motivational interviewing (MI), in a virtual environment.
4. Identify and apply best (working) practices for online learning sessions, including engaging diverse learning styles and adapting materials for those in remote areas (with a lack of access to technology).
5. Analyze case studies of specific (completed) projects with key lessons learned and recommendations for future applications.

BACKGROUND

According to the Substance Abuse and Mental Health Services Administration (SAMHSA),

the behavioral health workforce functions in a wide range of prevention, health care, and social service settings. These settings include prevention programs, community-based programs, inpatient treatment programs, primary care health delivery systems, emergency rooms, criminal justice systems, schools, or higher education institutions (SAMHSA, 2020a, para. 1).

The behavioral health workforce faced many challenges in delivering health care services before COVID-19. These challenges include stigma, workforce shortages, and health disparities, which have led to a lack of access to treatment, especially for black, indigenous, and people of color (BIPOC) populations, as well as those living in rural areas. Sixty-four percent of U.S. counties have a mental health provider shortage (University of Michigan Behavioral Health Workforce Research Center, 2018). Transportation, lack of evidence-based treatment options, being uninsured or underinsured, social norms, and stigma create barriers to substance use treatment for rural residents (Centers for Disease Control and Prevention [CDC], 2021).

The CAHS leads domestic and international networks to deliver TTA for multidisciplinary professionals who provide evidence-based mental health and substance use services in various settings (Health Resources and Services Administration [HRSA], 2020). In response to the syndemics of COVID-19, other infectious diseases, such as HIV and hepatitis C, and substance use disorders, the TTA networks focused on quickly modifying offerings to address the added challenges, meet educational needs, strengthen the behavioral health workforce, and leverage opportunities to build the workforce's capacity in innovative ways, including telehealth.

An essential part of TTA is ensuring all capacity-building efforts are evidence-based, including those offered virtually. An *evidence-based practice* (EBP) is an approach to services where health and behavioral professionals use the best evidence possible and use the most appropriate information to make clinical decisions for individual patients (APA Presidential Task Force on Evidence-Based Practice, 2006). Clinicians must stay current in their fields, and licensing authorities require most health professionals to participate in continuing education to maintain their licenses. Training and education are linked to career satisfaction, healthy work environments, and optimal quality patient care (Price & Reichert, 2017).

This rapid transition to virtual TTA required educators to focus on engaging adult learners and delivering practice-oriented instruction that meets the time and resource constraints of the behavioral health workforce. Having TTA grounded in andragogy's adult learning principles means ensuring learning is self-directed, experiential, relevant, process-oriented, competency-based, and life-centered (Halupa, 2015; Loeng, 2018). In such a learning process, adult learners can determine readiness, skills, and knowledge necessary and important to their current life situation. The teaching of adults can be pedagogical or heutagogical. *Heutagogy* is a holistic form of self-determined learning for all learners (Hase & Kenyon, 2000), enabling the learner to analyze and evaluate situations to proactively negotiate the learning process. Applying heutagogy is of particular importance as learners navigate the virtual learning environment in a highly autonomous and self-determined manner (Blaschke, 2012). Using andragogy's adult learning principles, reinforced by the self-determined heutagogy is critical for the behavioral health workforce since their time commitment to workplace learning is limited due to the nature of their work.

INTERPROFESSIONAL TRAINING AND TECHNICAL ASSISTANCE

This chapter describes how an interprofessional group of educators used innovative training and technical assistance to support behavioral health providers within national and international TTA networks.

The Educational Needs of the Behavioral Health Care Workforce

In a rapidly changing healthcare system, the need for continuous and updated education for the behavioral health workforce has been well documented (Hoge et al., 2004; HRSA, 2020; SAMHSA, 2020a). The COVID-19 pandemic and the resulting stay-at-home orders necessitated a rapid transition to the delivery of behavioral health services from traditional face-to-face encounters to the use of telehealth and telecommunication services (Moreland et al., 2020; Hames et al., 2020). The rapid transition created a need to provide evidence-based training and technical assistance to support the behavioral health workforce's educational needs (Becker et al., 2020; Hames et al., 2020).

Prior to COVID-19, the Institute of Medicine identified the need for virtual interprofessional education to support an effective, scalable, and sustainable solution for imparting foundational teamwork knowledge for health professionals (Djukic et al., 2015). During COVID-19, the U.S. Department of Health & Human Services (US HHS) encouraged the adoption of telehealth as a way to safely provide care to patients in mental health counseling (US HHS, 2020). Early studies indicate that behavioral health providers support the ongoing use of telehealth and telecommunication services and intend to continue these services post-pandemic (American Academy of Addiction Psychiatry [AAAP], 2020; Molfenter et al., 2021).

Nemec and Chan (2017) found that the use of any new treatment or technology requires training and support so that the users have the necessary competencies to effectively integrate the intervention or tool. Behavioral health care providers are facing a mounting mental health and substance use crisis in the U.S., due to the lingering social and economic stressors related to the COVID-19 pandemic (Fish & Mittal, 2021). Based on data from June 2018–June 2019 and May 2019-2020, overdose deaths from synthetic opioids increased 38.4% (CDC, 2020a). Overdose deaths, including by cocaine, increased by 26.5% during the same time period (CDC, 2020a). It is paramount that TTA networks support the behavioral health care workforce in the delivery of quality evidence-based care via a variety of modalities.

The Field of Substance Use

An agency of the Department of Health and Human Services (HHS), SAMHSA is charged with overseeing the quality of behavioral health services that address mental health and substance use disorders. Mental illnesses and substance use disorders are common, recurrent, and treatable; people can and do recover (SAMHSA, 2020a). According to the National Survey on Drug Use and Health, an estimated 19.3 million people aged 18 or older had substance use disorders, 51.5 million people aged 18 or older had a mental illness, and 9.5 million had both a SUD and mental illness or co-occurring disorder (SAMHSA, 2020b). The SAMHSA-funded TTA networks have a long history of delivering integrated training and technical assistance activities such as face-to-face training, skill-building activities such as learning communities, coaching and mentoring, capacity building around implementation, and online courses (asynchronous and synchronous). The TTA networks support continuous life-long learning and professional development and have been moving to support interprofessional learning that should be competency-based, embedded in the workplace, linked to patient needs, and undertaken by individual providers, teams, and institutions (Burrow-Sánchez et al., 2020; Miller et al., 2010). The COVID-19 pandemic and subsequent stay-at-home orders accelerated the need for accessible virtual learning. The TTA networks rapidly adapted to ensure that the behavioral health workforce had continuous access to remote TTA (Becker et al., 2020).

Fostering a Sense of Community across Networks

Essential to providing high-quality, evidence-based training and technical assistance to interprofessional audiences is the development of a sense of community across learners and networks. Rovai (2002) highlighted the "importance of building and sustaining a sense of community for virtual learning at levels that are comparable to the traditional face-to-face activities such as classrooms" (p. 1). Further, developing a sense of community across networks helps foster collaboration, spurring innovation and creativity. Through increased availability of technology (e.g., smartphones), access to vast amounts of information (e.g., the Internet), and instantaneous connections to groups through social media (e.g., Twitter and LinkedIn), the 21st century has opened opportunities for collaboration and networking, especially around education (Tibbetts & Hector-Mason, 2015). Developing a sense of community across the TTA networks enhances the motivation for learning and collaboration and opens opportunities to leverage resources across stakeholders. For example, the TTA networks hold annual national meetings as opportunities to develop staff professional skills, build team rapport, and identify cross-center collaborations. The CDC fund the Capacity Building Assistance (CBA) for High Impact HIV Prevention Program Integration CBA Provider Network (CPN). This TTA network's mission is to improve the performance of the HIV prevention workforce by increasing the knowledge, skills, technology, and infrastructure needed to implement and sustain science-based, culturally appropriate HIV prevention interventions and strategies (CDC, 2020b). During the COVID-19 pandemic, the CPN developed a highly interactive virtual exhibit booth so that the network could continue to promote their resources to stakeholders. Another example of adapting outreach to a virtual format is the National Clinical Training Center for Family Planning (NCTCFP) Clinician Café. The Clinician Café is a multimodal learning platform that allows participants to choose methods of learning that work for them in regard to different aspects of care provided in family planning settings (NCTCFP, 2021). These virtual events demonstrate how a sense of community can be developed in a virtual environment.

As previously defined, an EBP highlights several types of evidence: external evidence, a clinician's internal evidence, and critical appraisal of the evidence. The concept of EBP originates from and focuses on patient care. In this chapter, the target population in the training of EBPs is the behavioral health workforce. As described earlier, TTA is ensuring all capacity-building efforts are evidence-based. Adaptation is a process to modify an existing EBP to meet the unique needs of a target population, rather than reinvent a new program (Chen et al., 2013). The key is to make an EBP suitable for the target population without changing the core components (Kelly et al., 2000). The core components of TTA are the content (i.e., what is being taught) and the pedagogy (i.e., how the content is taught). Although lack of fidelity is a concern in an adaptation in general, it should not be an issue in the case of TTA with telehealth. This is because the core components of TTA are unchanged, and the only change is the delivery of training from being in-person to virtual. As an EBP, a *motivational interview* (MI) is "a directive, patient-centered style of interaction to promote behavioral change by helping patients explore and resolve ambivalence" (Levensky et al., 2007, p. 51). The MI approach has been applied to multiple fields. In the field of mental health and substance use disorders, MI is practiced based on the following assumptions (SAMHSA, 1999):

1. Ambivalence about substance use (and change) is normal.
2. Ambivalence can be resolved by working with a client's intrinsic motivations and values.
3. The alliance with clients is a collaborative partnership.
4. An empathic and supportive, yet directive, counseling style can facilitate the change process.

According to a systematic review of 41 studies, technology-assisted MIs were feasible to implement and well-accepted prior to COVID-19, with benefits of reducing costs and training burden, as well as expanding the range of clients (Shingleton & Palfai, 2016). Therefore, during the pandemic, a rapid transition to virtual MI in TTA has been a natural adaptation.

Adapting Training of EBPs

Diffusion of Innovations explains how an innovation is adopted in a population (Rogers, 1962). The innovation can be a new idea, behavior, or product. Compared with other frameworks of behavioral changes, Diffusion of Innovations offers a unique angle by characterizing five types of adopters. The characteristics of these adopters are briefly summarized below.

1. *Innovators* are eager to try new ideas and are also willing to take risks.
2. *Early adopters* provide opinion leadership about an innovation.
3. *Early majority* adopt innovation before the average person.
4. *Late majority* are cautious about innovation and adopt innovations after the average person.
5. *Laggards* are very conservative and the last to adopt an innovation.

Although, in theory, the distribution of adopters fits a normal distribution over time, the actual diffusion can occur unevenly. For instance, in the diffusion of intensive care unit (ICU) telehealth between 2003 and 2010, there was a delay from early adopters to the early majority (Kahn et al., 2014).

Based on Rogers' (1962) Diffusion of Innovations and various clinical innovations, Balas and Chapman proposed an "integrated road map for coordinating knowledge transformation and innovation adoption"

(Balas & Chapman, 2018, para. 1). In this road map, innovators are in clinical studies, early adopters are in leading practice, the early majority and late majority are in majority adoption, and laggards are in general access. In addition, activities facilitating the next wave of adoption, and inhibiting factors are outlined. For example, the adaptation of MI training to virtual training was necessary to support the behavioral health workforce. Coaching sessions were transitioned for delivery via online virtual meeting platforms such as Zoom. Training had to occur over multiple sessions in 2- to 4-hour increments, instead of an 8-hour training session. As the duration of the COVID-19 pandemic extended into a year, the need to provide virtual training in a variety of formats continues to be an important focus of TTA networks.

An essential feature of delivering virtual training is to have an online learning management system (LMS) to support learners across the world. CAHS has a robust LMS, HealtheKnowledge (HeK), established in 2008 with funding from SAMHSA as an online learning site for the Addiction Technology Transfer Center (ATTC) network. Most recently, administrators of the site began offering courses and user support in additional languages to accommodate a growing international audience. An examination of internal LMS tracking data (see Table 1), particularly comparing users pre-COVID-19 (March 2019–August 2019) to users during the U.S. stay-at-home mandate (March 2020–August 2020), showed a dramatic increase in course enrollments, activity completions, new users, visits, and time spent within the LMS. These HeK metrics demonstrate that a key to the successful delivery of virtual education is the use of synchronous and asynchronous learning (Dadd & Hinton, 2018).

Table 1. HealtheKnowledge LMS tracking data

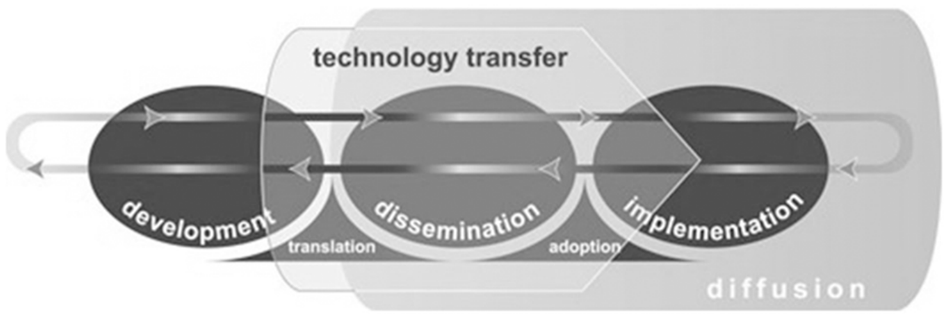
HealtheKnowledge metrics	March 2019–August 2019	March 2020–August 2020	Percentage of increase
Course enrollments	17,802	38,397	116%
Activity completions	153,478	282,402	84%
New users	11,971	16,240	36%
Visits	1,705,414	2,870,655	68%
Time spent	19,323 hours	29,173 hours	51%

Practical Models for the Continuum of the Diffusion of Innovations

To deliver innovative and yet practical TTA for EBPs, the ATTC Network developed a field-driven conceptual model of the innovation process, the technology transfer model (TT model; ATTC Center Network Technology Transfer Workgroup, 2011). The TT model and the definitions encompassed within the model allow for improved understanding and consensus regarding the distinct meaning and conceptual relationships between dimensions of the technology transfer process and accelerate the use of EBPs (ATTC Center Network Technology Transfer Workgroup, 2011). Based on the Diffusion of Innovations work of Everett Rogers (1962), the TT model outlines a multidimensional process that intentionally promotes innovation. Technology Transfer begins during the development of new technology, continues through its dissemination, and extends into its early implementation. This process requires multiple stakeholders and resources and involves translation and adoption activities (ATTC Center Network Technology Transfer Workgroup, 2011). The ATTC and subsequent funded Prevention (PTTC), Mental Health Technology

Transfer Networks (MHTTC), Opioid Response Network (ORN), and International Technology Transfer Center (ITTC) Network all build TTA delivery based on this model.

Figure 1. Technology transfer model

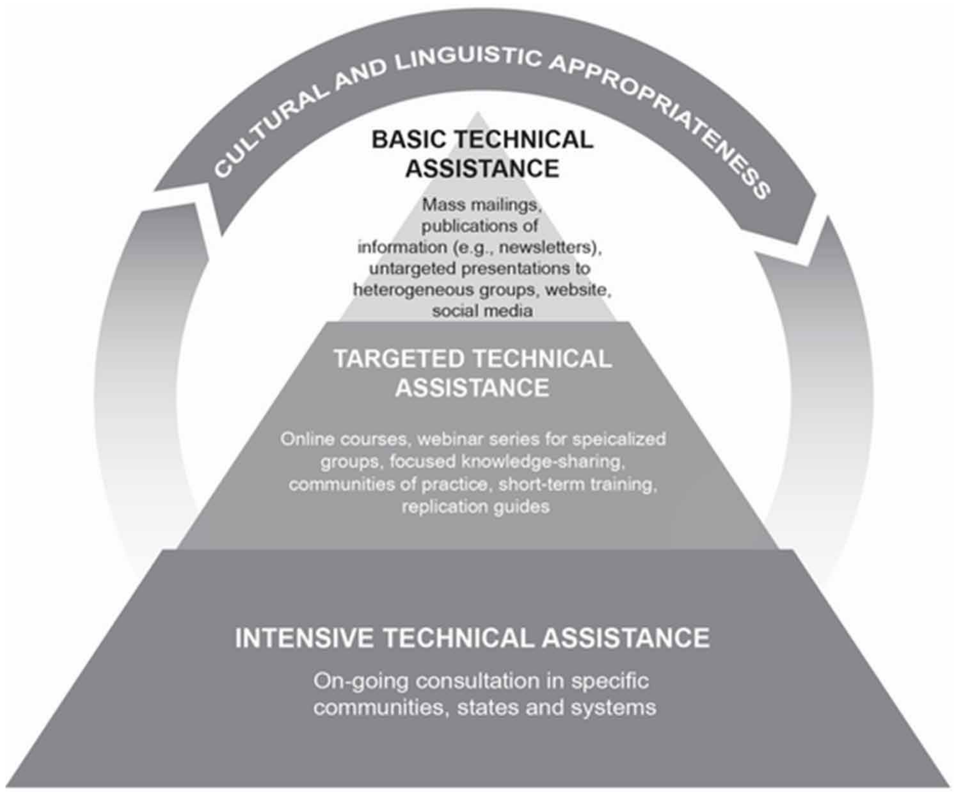


To enhance the delivery of TTA, the networks have fine-tuned the TT model to include a conceptual framework that differentiates among three types of technical assistance (TA, basic, targeted, and intensive (Becker et al., 2020). Basic TA is defined as information dissemination (e.g., conference presentations); targeted TA is defined as series of services to enhance readiness and capacity to implement an EBP (e.g., learning series or communities of practice); and intensive TA is defined as capacity-building efforts that support the full incorporation of innovations or EBPs including a range of implementation supports such as ongoing consultation and coaching (Becker et al., 2020). The TA framework is based on the work of Fixsen and colleagues (2009) and helps to focus TTA on the necessary inputs for the uptake of EBPs so that they are sustained and the expected outcomes are achieved with fidelity.

The ITTC Network was funded to develop and strengthen the workforce, organizations, and systems that provide substance use prevention, treatment, and recovery support services internationally (ITTC, 2021). The ITTC Network Coordinating Office, in partnership with the International Consortium of Universities on Drug Demand Reduction (ICUDDR), unites the centers into a mutually supportive network. This international network of universities and research centers across the world are utilizing a variety of strategies to accelerate the use of scientifically based and culturally appropriate practices in seven countries: South Africa, Ukraine, Vietnam, the United Arab Emirates, Columbia, Peru, and the U.S.

Infused within the TA framework is culturally and linguistically appropriate care, as a means of addressing underlying racial or ethnic disparities (Brooks & Hopkins, 2017). The Technology Transfer Center network builds the capacity of staff internally, provides training and TA externally. It designs policy and procedures to reinforce organizational and individual learning around diversity, equity, and inclusion (DEI). This includes extensive resources to support the implementation of Culturally and Linguistically Appropriate Services, a focus on cultural humility and inclusion, health equity, and a specific focus on marginalized communities (ATTC, 2019). Specific committees composed of community members meet to review and approve training and TA materials prior to materials being disseminated. Internal staff training increases individual staff self-awareness and reinforces cultural humility as a life-long process of exploring individual bias, assumptions, and stereotypes and seeing how this creates systems of oppression and privilege that can impact behavioral healthcare service delivery. Building culturally responsive networks requires integrating and coordinating a response to comprehensively addressing power relationships across the networks and within organizations (Shogren, 2019). A culturally responsive organization is one that is dynamic, on a committed path to improvement and one that is purposefully designed to be responsive to the interests of communities of color, service users of color, and staff of color.

Figure 2. Technical Assistance Framework



Adult-Focused Instructional Methods in a Virtual Environment

TTA centers' primary audience is professional adults; therefore, adult learning principles are paramount. Adult learners are self-directed and enjoy both experiential and competency-based learning (Loeng, 2018). The TTA networks have a strong history of differentiated instruction, for example, applying standardized patients, role-plays, and simulation learning activities. Further, for intensive TA, TTA networks often use a Learning Collaborative model or Project Extension for Community Healthcare Outcomes (Project ECHO). Learning Collaborative model is a short-term (6- to 15-month) learning system that brings together many teams to seek improvement in a focused topic area (Hoge et al., 2020; Institute for Healthcare Improvement, 2003). Project ECHO tele-education model bridges knowledge gaps between specialists at academic health centers and primary care providers from remote areas (Zhou et al., 2016). Many of the TTA networks are designated as official Project ECHO replication partners (University of

New Mexico, n.d.). These learning strategies enable TTA networks to deliver TA across the TA Framework and help systems and organizations sustain new practices. For example, the Mid-America ATTC and other ATTCs host virtual learning collaboratives to help professionals throughout their region implement various evidence-based practices related to substance use disorder treatment and recovery. Topics included "Mobile Apps as Clinician Extenders in SUD Treatment and Recovery: Emerging Possibilities" and "Telehealth Learning and Consultation Tuesdays." These events were designed to support behavioral health providers' transition to virtual during the COVID-19 pandemic (Mid-America ATTC, 2020).

The diversity of educational practices that the TTA networks utilize allows for the delivery of adult-focused instructional methods. These methods have been delivered both online and in person. It is upon this rich foundation that the TTA networks have responded to the rapid transition to virtual because of the COVID-19 pandemic. Some of these adaptations include using a flipped classroom model, video content that reinforces lessons, a mix of synchronous and asynchronous activities, and facilitated virtual breakout rooms (Tucker, 2012).

CASE STUDIES: TRAINING AND TECHNICAL ASSISTANCE IN PRACTICE

Each case study clarifies the issue/challenge, describes the project, collaborators, and concludes with brief lessons learned. A final summary collates the lessons learned and offers some potential strategies and recommendations for integrating virtual training and technical assistance.

The case studies include:

1. The Addiction Technology Transfer Center Network Telehealth Series
2. The Opioid Response Network Virtual Community Collaborations

Case Study 1: The Addiction Technology Transfer Center (ATTC) Networks Telehealth Series

Background

During the COVID-19 Public Health Emergency, the U.S. government relaxed the telehealth requirements (US HHS, 2020). This left a huge need for the behavioral health workforce to pivot and provide these necessary services. Many of the changes included changes around Health Insurance Portability and Accountability (HIPAA) flexibility, telehealth waivers for the Centers for Medicaid and Medicare Services (CMS), and cost-sharing for patients in federal healthcare programs (US HHS, 2020; ATTC, 2020). In addition to the changes to national policies in delivering telehealth services, providers need to adhere to state and local policies. Furthermore, the policies governing telehealth vary state by state, including how to deliver telehealth services across state lines (US HHS, 2020; ATTC, 2020). Finally, providers were left sorting through reimbursement policies, looking for ways to deliver quality services, and providing the necessary tools to offer telehealth services, such as HIPAA-compliant software programs (ATTC, 2020).

Issues

The COVID-19 pandemic spurred the rapid transition to telehealth delivery for behavioral health services. The primary issue that presented was a need to provide quality education and evidence-based resources to the field in a timely fashion. Prior to COVID-19, the use of telehealth in behavioral health was minimal (Weigel et al., 2020). The U.S. government relaxed policies and restrictions on telehealth and waived HIPAA enforcement, and the Drug Enforcement Agency (DEA) loosened requirements on e-prescribing of controlled substances (US HHS, 2020; Weigel et al., 2020). Policy makers, insurers, health systems, and providers needed to move quickly to create accessible services for their patients. There was a critical need to deliver uninterrupted services, and providers had to rapidly adapt to implement telehealth, which required a significant investment in infrastructure and workforce (ATTC, 2020; Weigel et al., 2020). Several issues arose with respect to client privacy and provider logistics, such as having the space and technology to provide telehealth services and building workforce capacity, which needed to be swiftly addressed (ATTC, 2020; Maese et al., 2020; US HHS, 2020). Finally, providing adequate support to the behavioral health workforce, including providing peer recovery support services, emerged as an essential issue (ATTC, 2020; US HHS, 2020).

Project Details

The ATTC Network rapidly convened a group of subject matter experts, clinicians, lawyers, and educators. Within one week of the U.S.-wide stay-at-home orders, the ATTC launched an eight-part telehealth learning series for substance use treatment and recovery support providers (ATTC, 2020). A collaboration across TTA networks produced an eight-part webinar series, an informational website that housed credible resources and other educational products such as toolkits and frequently asked questions (ATTC, 2020). The ATTC Network led this collaboration; additional collaborators included the Center for Excellence on Protected Health Information (CoE-PHI), the National Consortium of Telehealth Resource Centers, and the Center for the Application of Substance Abuse Technologies (CASAT) at the University of Nevada, Reno (UNR; ATTC, 2020). These activities were spurred by the COVID-19 pandemic and grounded in the need to rapidly provide TTA to the behavioral health field and get the best evidence-based information to the field. The COVID-19 pandemic has pushed telehealth services implementation to a level that has bypassed 30 years of advocacy, forcing systems to align policy, technology, and economics, resulting in groundbreaking policy changes (Nemec & Chan, 2017; Maese et al., 2020).

Process

The process of convening, developing, and implementing a web-based learning series amid a pandemic required the leadership of a group of TTA centers that had the core knowledge and expertise in telehealth and the accompanying legal issues. The ATTC Network had existing relationships with other TTA centers in key content areas such as privacy laws. Additionally, the TTA centers had to have the necessary resources and staff to launch a series that simultaneously developed and delivered content. Resources, such as the proper webinar software programs, can host thousands of providers, plus a team of staff to support website development, webinar technology, podcast technology, and communications and marketing needs.

The TTA centers are committed to delivering evidence-based content while focusing on the adult learner's need to get relevant information that they can use within their work settings. Therefore, grounding the process in adult learning principles is foundational. The ATTC followed a flipped instruction design model for the telehealth learning series. Each telehealth webinar session started with a facilitated discussion of the top questions from the participants and was facilitated by a subject matter expert; each session then ended with didactic content for the specific topic area and was presented in the format of the top five things the participants needed to know within the topic area. Finally, resources were provided to all session participants, each session recording was posted on the project website, along with a transcript of the session, links to relevant handout materials and other informational websites, and a subsequent accompanying podcast summarizing the main take-home lessons for each topic area (ATTC, 2011). The topic areas covered were: Best Clinical Practices for Treatment with Telehealth; Privacy Considerations for Telehealth During COVID-19; Groups via Telehealth; Billing and Reimbursement; Tips for Engaging & Interacting in a Virtual Session; Tips for Successful Telehealth Implementation; Tips for Recovery Community and Support Services; and Self Care: Hope Matters (ATTC, 2020).

Outcomes

Over two months, an eight-part series was designed and launched to address the changes in policy and delivery of telehealth services for the delivery of behavioral health and substance use services. Thousands of providers were provided with key information, resources, and access to the top subject matter experts that could support their delivery of telehealth. These resources were further disseminated via the ATTC website and through each of the TTA networks' email distribution lists and communication channels (electronic newsletters and social media outlets). Additionally, a wealth of materials created from the learning series (e.g., recorded webinars, transcripts, podcasts, materials, and frequently asked questions) are enduring products that can be further disseminated.

Lessons Learned

Convening the Right Partners is Essential

Having the right stakeholder in content knowledge is critical to launching a learning series focused on policy changes. TTA networks leveraged existing knowledge in telehealth content and legal policy so that quality evidence-based information could be disseminated.

Critical Staffing and Other Resources for Technological Support

It is critical to have the right staff to support the behind-the-scenes needs of the project. In order to develop, deliver, and post supporting materials, multiple staff contributed to the development and delivery. It is necessary to have the existing infrastructure of the TTA networks website, webinar software programs, and other technological supports.

Quick Turnaround

The TTA networks delivered the necessary content related to providing telehealth services and addressed the rapid changes to the policy governing telehealth services for rapid dissemination. This requires many partners, subject matter experts, and resources.

Case Study 2: The Opioid Response Network Virtual Community Collaborations

Background

The Opioid Response Network (ORN) is designed to respond to community needs around the opioid epidemic and stimulant use disorder. This means that requests come from the state or county health department or any other community stakeholder, and the ORN custom designs training and TA to meet the needs of the requestor. Usually, requests come from established communities such as metro areas that have clarity on their training and TA needs, which can leave gaps in requests from rural areas and underserved populations. The swift onset of the pandemic and lack of availability to travel into rural areas created a need for innovative solutions to virtually engage rural and underserved populations and continue offering training and TA. The Virtual Community Collaboration model was one ORN response to continuing training and TA during the pandemic.

Prior to the pandemic, overdoses increased across the U.S. from 1999 to 2015, yet the most impacted counties were rural. Non-fatal overdoses were higher in rural counties, and overdose deaths in rural counties surpassed urban areas and increased by 325% (Mack et al., 2017; Keyes et al., 2014). Safe opioid prescribing efforts have decreased across the U.S., yet this decline is slower in rural counties (Bolinski et al., 2019). Stigma is often cited as a reason why office-based opioid treatment is limited in rural communities, where 29.8% of rural Americans live in counties without a provider who can prescribe life-saving medications for addiction treatment (MAT), such as buprenorphine, compared with only 2.2% of urban Americans (Andrilla et al., 2019). Stigma and negative perceptions of opioid use disorder (OUD), people in OUD treatment and recovery, and MAT collectively undermine prevention, treatment, and recovery responses and are correlated with ongoing substance use, reduced retention and engagement in treatment, access to treatment, non-fatal overdose rates, and sub-optimal healthcare delivery (Haffajee et al., 2018; Kennedy-Hendricks et al., 2016; Kulesza et al., 2017; Latkin et al., 2019). This is exacerbated in rural areas which lack transportation options, where the drive time to an Opioid Treatment Provider is longer than to a Federally Qualified Health Center and significantly different to urban areas (Joudrey et al., 2019). This reinforces the need to expand MAT in rural areas while addressing stigma to increase access to treatment and care.

Issues

The pandemic exacerbated many issues in rural areas (CDC, 2021) yet also created opportunities to increase access using telehealth (SAMHSA, 2020c). However, if stigma towards both substance use disorder and MAT is not eliminated, it will persist as a barrier to developing innovative, local responses to the opioid epidemic. Interventions to address the community-based stigma around opioid use disorder include mass media communication and educational campaigns, law enforcement training, and school-based interventions (Arredondo et al., 2019; Bachhuber et al., 2015; McGinty et al., 2018). Interventions to address provider stigma around opioid and substance use disorder and MAT include curriculum interventions at the undergraduate, graduate, and continuing medical education level, as well as mentoring of primary and other healthcare providers from addiction medicine specialists or through Project ECHO (Association of American Medical Colleges, 2019; Komaromy et al., 2016; Wakeman & Barnett, 2018). The use of storytelling, in which people with lived experience of opioid use disorder share their experiences in a way that promotes positive messaging around recovery, may also reduce stigma and improve the attitudes of community members and medical providers toward people with substance use disorders (Livingston et al., 2012)—leveraging these opportunities while integrating aspects of interventions known to successfully address stigma was a key goal of the Virtual Community Collaborations.

Project Details

Examples of successful interventions provide some insights into addressing stigma in rural and underserved communities, reinforcing the need to engage diverse community stakeholders with addiction professionals and people in long-term recovery. The SAMHSA-funded ORN Community Collaborations project supports stigma-elimination efforts by building capacity and partnerships across the prevention, treatment, and recovery workforces and engaging key stakeholders, including law enforcement, faith-based and recovery supports, primary and community-based healthcare providers, schools, health and social service departments, and other community groups. In response to the syndemics of COVID-19 and opioid use disorder, the ORN developed a Virtual Community Collaboration model to engage underserved communities and address the stigma around the opioid epidemic, MAT, and substance use disorder more generally. The intent is to prioritize rural underserved regions and communities, disseminate key evidence-based information and resources across core topics, while also adapting live sessions to the specific region or community context to collaboratively plan and partner to build community capacity to address the opioid epidemic and reduce stigma around substance use disorder and MAT.

Process

Program Development

Initial discussions across our prevention, treatment, and recovery teams established a format that included two 2-hour live sessions and a 7.5-hour pre-recorded curriculum. Program development decisions were focused on balancing competing priorities during a pandemic (many people were working full-time from home, while adapting to a virtual environment), identifying when synchronous virtual time was critical and what could be disseminated asynchronously, plus discussing what amount of time was realistic to ensure event registration. Live sessions of 2 hours seemed optimal for attendance, while any presented materials could be pre-recorded.

Pre-recorded topics included: Evidence-Based Approaches to Prevention, Treatment, and Recovery; Effective Approaches for Youth and Adolescents; Family Centered Care (pregnant and postpartum women and their families); Impact of Stigma on Care and Stigma Reduction Approaches; and Impact on the Social Determinants of Health and COVID-19 on the opioid epidemic; as well as an overview of available technical assistance. Diverse subject matter experts (across genders, races or ethnicities, lived experiences, ages, and geographies) were selected to present materials and often presented in tandem to more effectively present diverse viewpoints. All materials (slides, recordings, transcripts, and quizzes) were made accessible and uploaded to the CAHS LMS, which was outlined in the Adapting Training of Evidence-Based Practices section.

Planning

An initial step was to coordinate across our own network and ensure buy-in and coordination of efforts. An initial meeting also ensured introductions to key stakeholders and identifying any gatekeepers. Reaching out to these key stakeholders and gatekeepers and engaging them as early as possible was critical to gain support for any programs and gather critical information to help inform the live program and select a specific area of focus. Building online relationships and comfort with working and collaborating virtually required more video meetings, building stronger relationships with stakeholders who were now responsible for the majority of marketing and were taking extra time for outreach and engagement.

Implementation

A Zoom meeting was selected for live sessions to facilitate increased engagement and more interaction between facilitators and participants who could see and respond to each other. A Zoom webinar is a more controlled format as far as preventing participants from disrupting or unmuting without permission, but it also creates greater distance between the presenters, facilitators, and participants. To reinforce that any training and capacity-building efforts were building on existing work in the region and to highlight successes from within the region, the first live session focused on people from the community sharing what is already happening in that community. Key regional representatives discussed the impact of the current pandemic and outlined the differential impacts on underserved populations. Participants were then engaged in strategic discussions using breakout groups. After a break of 4–6 weeks to complete the pre-recorded curriculum, participants engaged in a second live session that included a participant-directed question and answer panel and predetermined breakout groups focused on ways to address key topics identified by the community.

Follow-Up

A final report is shared with anyone who participates in the live sessions and outlines key issues raised, shares valuable resources, and outlines some recommendations of ways to address the opioid epidemic and stimulant use disorder. This is reinforced by a video meeting scheduled to review these recommendations and continue to build on the relationship.

Outcomes

Since March 2020, the ORN has developed a comprehensive curriculum in both English and Spanish that can be used as a stand-alone course (without the live sessions) to offer up to 7.5 hours of continuing education credits across medical, nursing, social work, community health educators, and other behavioral health accreditation bodies. The English Virtual Community Collaboration went live in January 2021, and (as of March 1, 2021) 181 people have participated in the course. The Spanish course (Colaboración de Comunidades Virtuales en Español) went live on February 15, 2021, and 24 people have enrolled. We anticipate marketing in 2021 should drive greater numbers to engage in both courses.

Since August of 2020, three live Virtual Community Collaboration programs have been completed in rural, underserved communities, with six more planned in both English and Spanish. Other important outcomes include increased opportunities to build on existing relationships with state leaders and highlight potential partnerships; the ability to market and promote ORN and the network of TTA services, core, and national partners, and to reinforce ways existing efforts can be supported; and specifically to encourage more requests from underserved areas for the ORN.

Lessons Learned

Engage Key Stakeholders and Gatekeepers from the Beginning

Planning efforts are repeatedly stalled and/or impacted when a key stakeholder is missed from the initial decision-making process. This is exacerbated in an online setting where the majority of information and planning is conducted through email and Zoom. Stakeholders can support promoting efforts within the community, marketing to their listservs, and engaging people at existing community events. Access to live events, which may usually be used for marketing, is restricted during the pandemic, so taking extra time for outreach and engagement is essential.

Listen: Learn as Much as Possible Before Engaging in Community Training

A key part of any community-based participatory training efforts is to ensure we listen carefully to the community, work to build a relationship and trust, and gather as much information around what is critical to the community's existing needs, including their technological needs and familiarity with the tools we are using online. Practicing cultural humility and acknowledging that those in the community have the expertise of what may work in their community, why some efforts have previously failed, and what should be prioritized (and why) can facilitate more effective efforts to partner and offer TTA. The online forum is a new medium for many, and building trust in an online setting takes intention and focus. People are learning both new technological skills as well as new virtual collaboration skills and this learning curve should be acknowledged and incorporated into community training efforts to increase ease of use and comfort in participating virtually.

Follow-Up and Build Relationships

Many times, we engage communities in TTA and the only follow-up is related to evaluation. It is critical to find ways to continue outreach, share a useful overview of the meeting, capture key resources shared, and outline ways partnerships can continue. In an online environment, people can feel even more disconnected, so more time is needed to build, sustain, and grow any relationship created. While an email may outline critical information, a Zoom video call can let individuals and groups connect to a face, voice, and person and build stronger relationships.

Lessons Learned and Implications for Training and Technical Assistance

Analyzing key themes from the case studies offers some implications and recommendations for future online training and technical assistance around behavioral health. While this list is by no means exhaustive or hierarchical, key themes, implications, and recommendations that emerge from the case studies outlined are categorized into four areas: adapting, convening, resources, and community.

- Adapting
    - Program adaptation: The adaptation of TTA to deliver EBPs to meet the needs of a virtual environment requires subject matter experts (SMEs), program developers, and dedicated resources.
- Convening
    - Engagement: The commitment of key stakeholders and gatekeepers requires building in time for outreach.
- Resources
    - Technological resources: Existing infrastructure such as websites, webinar software platforms, and other technological supports is important.
- Community
    - Be community-informed: Let the community guide the process for development and either respond to their needs or include their contributions in material development.

ISSUES, CONTROVERSIES, PROBLEMS

To assist with behavioral health professionals' educational needs, as a result of the COVID-19 pandemic, and sustain their educational needs post-pandemic, the national and international TTA networks have moved swiftly to adapt educational methods to assist the field in mitigating challenges. Some of the challenges include rapidly scaling up to provide behavioral health services remotely via telehealth. Rural and remote committees face challenges like access to broadband Internet access, lack of transportation, and lack of evidence-based treatment options (Bolinski et al., 2019). Other challenges for the behavioral health workforce include dealing with stigma surrounding mental health and substance use, workforce shortages, and health disparities (Andrilla et al., 2019; McKnight-Eily et al., 2021). Health disparities for BIPOC and lower socioeconomic communities have been compounded by COVID-19 and have further deepened disparities (McKnight-Eily et al., 2021; Trent et al., 2019). Finally, to implement EBPs in the context of the behavioral health field and amid the COVID-19 pandemic, a deep understanding of the complexities of implementation science is needed, including the necessary funding (Eccles & Mittman, 2006).

SOLUTIONS AND RECOMMENDATIONS

Many challenges face the behavioral health workforce in the midst of the COVID-19 pandemic and sustaining these needs post-pandemic. Some solutions and recommendations that the national and international TTA networks have and should employ include:

- Using technology to foster collaboration in a multitude of ways, such as mobile devices, social media, synchronous and asynchronous events: online courses, webinars, and video recordings

- Addressing the needs of rural and remote communities' technology challenges by increasing broadband Internet access through the expansion of coverage, improving access services with mobile service delivery (mobile vans), and the expansion of telehealth and telemedicine
- Addressing stigma surrounding mental health and substance use through open dialogue, being conscious of language, showing compassion, and encouraging equity

FUTURE RESEARCH DIRECTIONS

The COVID-19 pandemic presented an unprecedented set of challenges for the behavioral health workforce (pre- and post-professional), including those who are in U.S. domestic and international TTA networks. When facing a challenge, there are also opportunities to reinvigorate TTA by applying differentiated instruction grounded in adult learning principles. Future educational programming should focus on expanding funded TTA networks that utilize hybrid models of TTA applying online and face-to-face programming (Becker et al., 2020; Molfenter et al., 2021; AAAP, 2020). Another area of future development and expansion centers on the engagement of previously underserved communities. Providers, clinicians, policy makers, and other stakeholders need to address diversity and inclusion issues by learning about, teaching, and disseminating anti-racist principles in substance use education, research, clinical practice, and policy (Hagle et al., 2021). Finally, future research should focus on articulating the key ingredients of successful and sustainable TTA for the uptake of EBPs, including examining the types of TTA, frequency, and the number of educational activities necessary to sustain practice change (ATTC, 2011; Beck, et al., 2018; Becker et al., 2020).

CONCLUSION

This chapter describes the training and educational practices employed by an interprofessional group of educators who have used innovative TTA to support behavioral health providers within national and international TTA networks. The COVID-19 pandemic exacerbated existing mental health and substance use disorders and highlighted the need to provide quality evidence-based training to support the workforce. The COVID-19 pandemic compelled a rapid transition to the delivery of behavioral health services from traditional face-to-face encounters to the use of telehealth and telecommunication services (Moreland et al., 2020; Hames et al., 2020). Other challenges that the behavioral health workforce face include stigma, workforce shortages, and health disparities, which lead to a lack of access to treatment, especially for BIPOC populations and those living in rural and remote areas. An essential part of TTA is ensuring that capacity-building efforts are evidence-based, including those offered virtually. Providing high-quality instruction that uses multiple modalities is important, especially in a virtual environment. The rapid transition created a need for TTA networks to quickly innovate to ensure that the behavioral health workforce had the necessary skills to deliver these services (Becker et al., 2020; Hames et al., 2020).

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KEY TERMS AND DEFINITIONS

Behavioral Health Workforce: The group of practitioners that work to prevent or treat people with a mental illness or substance use disorder. It is an interprofessional group of practitioners including doctors, nurses, social workers, addiction counselors, and psychologists, as well as people with "lived experiences" such as peer recovery support specialists and prevention specialists (HRSA, 2020).

Evidence-Based Practice (EBP): An approach to services in which health and behavioral professionals use the best evidence possible and use the most appropriate information to make clinical decisions for individual patients (APA, 2006).

Substance Use: The use—even one time—of any of the substances. Substances are psychoactive compounds with the potential to cause health and social problems, including substance use disorders (and their most severe manifestation, addiction). Substances are categorized as alcohol (i.e., beer, wine, liquor; illicit drugs (i.e., cocaine, heroin); prescription-type medications that are used for nonmedical purposes (i.e., pain relievers) and over-the-counter drugs or other substances (i.e., cough and cold medicines, inhalants; Office of the Surgeon General, 2016).

Substance Use Disorder (SUD): Repeated, regular misuse of any substances that may lead to the development of a substance use disorder. Severe substance use disorders are characterized by compulsive use of substance(s) and impaired control of substance use. Substance use disorder diagnoses are based on criteria specified in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM; Office of the Surgeon General, 2016).

Technical Assistance Framework: A conceptual framework that differentiates among three types of technical assistance: basic, targeted, and intensive (Becker et al., 2020).

Technology Transfer Model: A field-driven conceptual model of a multidimensional process that intentionally promotes innovation. It was developed by the ATTC Network (ATTC, 2011).

Training and Technical Assistance (TTA): The planning, development, and delivery of activities designed to achieve specific learning objectives, resolve problems, and foster the application of innovative approaches to develop and strengthen the specialized behavioral healthcare and primary healthcare workforce that provides SUD treatment and recovery support services (Bureau of Justice Assistance, n.d.; SAMHSA, 2017).

Chapter 12
Clinical Skills Development in the Virtual Learning Environment:
Adapting to a New World

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ABSTRACT

The rapid transition to distance learning in response to the unexpected SARS-CoV-2/COVID-19 pandemic led to disruption of clinical skills development, which are typically conducted face-to-face. Consequently, faculty adapted their courses, using a multitude of active learning modalities, to meet student learning objectives in the didactic and experiential settings. Strategies and considerations to implement innovative delivery methods and address potential challenges are elucidated. Furthermore, integration of a layered learning approach may allow for more broad perspectives and allow additional interactions and feedback, which is especially necessary in the virtual environment.

INTRODUCTION

The novel coronavirus disease 2019 (COVID-19) pandemic caused by SARS-CoV2 precipitated a tremendous and tumultuous wave of unexpected changes, including immediate curricular challenges among academic health professional programs and the need to adapt to a permanently altered healthcare practice landscape. The rapid transition to virtual learning environments posed many challenges, especially related to clinical skills development in both the didactic and experiential settings. This challenged academicians to expeditiously adapt curricula to meet student needs while maintaining accreditation requirements. Since the peak of the COVID-19 pandemic, it has become increasingly clear that the healthcare environment to which learners enter has morphed more permanently than expected to include more telehealth and a greater focus on social determinants of care. The objectives of this chapter are to elucidate innovative ways to teach clinical skills in the virtual environment through active learning and simulation. Lessons learned are also discussed to further develop and enhance such pedagogy in the virtual setting.

BACKGROUND

Health professional degrees culminate in licensure exams, which are required for clinicians to enter the workforce. Respective accreditation bodies provide guidance to ensure that graduates are practice-ready. While programmatic structure varies among disciplines and programs in course format, duration, schedule, faculty model, and number of campuses served, a common thread is the use of active learning and simulation to enhance critical thinking and develop hands-on clinical skills in various settings (Bonwell & Eisen, 1991). The scope of this chapter encompasses various health professions that require training in clinical, technical, and communication skills including athletic training, audiology, dentistry, medicine, nursing, pharmacy, physical therapy, physician assistant, and social work.

Accredited programs require satisfactory completion of a minimum number of clinical hours to ensure that graduates are practice-ready in real-world settings. However, the different accreditation bodies that guide various health disciplines define and quantify simulation in various ways (Table 1). The COVID-19 pandemic has posed multiple challenges that require adjustment, necessitating faculty to become ever more resourceful to rapidly adapt to virtual learning. From a faculty perspective, the amount of time needed to modify existing course materials for the virtual learning environment represented an unexpected expansion of the faculty workload. The ability to involve adjunct faculty members in this process remotely has been advantageous in increasing their involvement in the didactic setting. Students have shared that many feel overwhelmed, disengaged, and lack a sense of community with virtual learning. These factors should be taken under consideration by faculty when reformatting courses and focusing on clinical skills development.

Table 1. Accreditation standards regarding incorporation of simulation

Health Profession	Simulation Guidance in Accreditation Standards
Athletic training	No specific guidance regarding the use of simulation, however defines the laboratory setting as one "where students practice skills on a simulated patient (i.e., role playing) in a controlled environment" (Commission on Accreditation of Athletic Training Education, 2013, p.17).
Audiology	No specific guidance regarding the use of simulation, but states in Standard 21 that the program should use multiple methods of instruction where simulation is provided as an example (Accreditation Commission for Audiology Education, 2016).
Dentistry	No specific guidance regarding the use of simulation, but states in Standard 2-9 those prospective simulations in which students perform decision-making can be used as evidence to assure graduates are competent in the use of critical thinking and problem-solving skills (Commission on Dental Accreditation, 2016).
Medicine	No specific guidance regarding the use of simulation, but states that skills (e.g., communication and clinical) should be taught (Commission on Osteopathic College Accreditation, 2019; Liaison Committee on Medical Education, 2021).
Nursing	An expert panel consisting of representatives from several nursing organizations and the National Council of State Boards of Nursing (NCSBN) developed guidelines for the use of simulation as a substitute for traditional clinical experience. These guidelines are based on data from the NCSBN National Simulation Study, which found that there was no statistically significant difference in knowledge acquisition or clinical performance when substituting clinical experiences with up to 50% simulation (The National Council of State Boards of Nursing, 2016).
Pharmacy	States that simulated practice experiences can be incorporated into the Introductory Pharmacy Practice Experiences (IPPE) to mimic pharmacist-delivered patient care situations for a maximum of 60 of the total 300 clock hours. Accreditation standards also state that colleges and schools of pharmacy should have a sufficient number of faculty members to address the needs of simulation teaching and provide access to educational simulation capabilities (Accreditation Council for Pharmacy Education, 2015).
Physical therapy	States that clinical education experiences that occur before the completion of the didactic curriculum cannot be satisfied with the use of simulation (Commission on Accreditation in Physical Therapy Education, 2020).
Physician assistant	No specific guidance regarding the use of simulation, but states that skills (e.g., communication and clinical) should be taught (Accreditation Review Commission on Education for the Physician Assistant, Inc., 2019).
Social work	States that each competency should be assessed by two measures, one of which can be based on real or simulated practice encounters (Council on Social Work Education Commission on Accreditation Commission on Educational Policy, 2015).

These were not the only factors that impacted healthcare education during the COVID-19 pandemic. Within the experiential setting, many sites were forced to limit or discontinue students' clinical rotations in response to the overwhelming numbers of COVID-19 positive patients and the need to reduce exposure risk. Simulation-based mastery learning allows for convergence of multiple adult learning theoretical models, which represent ideal means to engage learners in the application of didactic content (Aebersold, 2018; McGahie &Harris, 2018). Multiple simulation modalities are available for use, including role playing with standardized patients, use of manikins, utilization of task-trainers, and virtual reality. Many innovative techniques that span many learning styles have been embedded within courses. While active learning strategies had already been implemented in the traditional classroom setting, the increase in online learning and the concomitant emergence of new technologies has caused a shift in the paradigms used for online active learning (Allen et al., 2002). In particular, the expectations of appropriate etiquette in the virtual learning environment should become essential components of orientation sessions to optimize the learning experience for both learners and instructors.

Methods by which to strengthen critical thinking and clinical problem-solving skills in both didactic and experiential settings have shifted due to the COVID-19 pandemic. Since the terminology used within the literature varies widely, clarification of definitions is offered to support standardization throughout this chapter. Here, virtual learning (i.e., e-learning) is defined as instruction delivered on a digital device (e.g., laptop computer, tablet, smart phone) that is meant to support learning (Clark & Mayer, 2016). Virtual learning can be thought of in two different ways: synchronous or asynchronous. Each form of instruction can support collaborative learning via discussion boards, breakout rooms, or other forms of virtual collaboration. Synchronous and asynchronous learning can also be combined to generate blended learning delivery. Regardless of the delivery format or type of media used, virtual learning requires engagement of learners through behavioral (e.g., typing an answer to a question in the chat box) and psychological engagement (e.g., cognitive processing that leads to new skills). While virtual learning has many benefits, there are also several challenges to consider during its implementation, such as incorporating new technology that does not align with the instructional goal or incorporating too much or not enough of the new technology. These opportunities and challenges will be further discussed with a focus on active learning strategies that strengthen clinical skills in didactic or virtual settings, respectively, followed by a discussion of strategies to enhance etiquette that fosters a sense of community and collaboration within the virtual learning environment.

INNOVATIVE APPROACHES TO ACTIVE LEARNING IN THE DIDACTIC SETTING

Many approaches for developing clinical skills in a virtual environment were introduced to the curriculum as programs quickly pivoted to virtual instruction during the COVID-19 pandemic. While didactic lectures can be delivered via video conferencing platforms, the inclusion of some active learning strategies (i.e., think-pair-share, case studies, and simulation) may require additional preparation. Logistics for developing and offering virtual simulations (using standardized patients for telehealth visits, virtual/augmented reality, and/or low- and high-fidelity manikins) using video conferencing platforms and other gamification approaches, such as virtual escape rooms, will be discussed in this section.

Telehealth

Telehealth refers to the use of technology to connect health professionals with patients and other professionals who are in remote or distant locations (American Telemedicine Association, 2021). By comparison, digital health refers to a broader field that uses additional technologies, such as smart devices, artificial intelligence, genomics, and big data to improve health (World Health Organization, 2019). Prior to the COVID-19 pandemic, telehealth and virtual care had already proven to be beneficial for underserved, vulnerable, and/or rural populations (American Telemedicine Association, 2021). During the COVID-19 pandemic, patient care provided through telehealth increased from 47% in 2019 to 97% in 2020 in one study of health centers (Demeke et al., 2021). Since the peak of the COVID-19 pandemic, increased utilization has persisted as healthcare administrators begin to establish regulations that support long term telehealth integration into routine healthcare delivery with support (American Hospital Association, 2021).

Within health professions education, it is imperative that students receive training on best practices, patient privacy, available modalities, advantages and disadvantages of digital health and telehealth versus face-to-face visits, and effective communication skills so that graduates may deploy successful services in their future practice environments, especially given the changing landscape (Agency for Healthcare Research and Quality, 2015; Koonin et al., 2020). The International Pharmaceutical Federation (FIP) Digital Health in Pharmacy Education report urges schools of pharmacy to provide education for students in digital health to prepare them for this vast and growing aspect of practice (International Pharmaceutical Federation [FIP], 2021). One method for doing so would incorporate this technology into lab activities. From that perspective, development of simulations that provide opportunities for students to practice in a telehealth environment, with targeted feedback, would be beneficial for the student's professional growth. Several modalities can facilitate telehealth collaboration, including telecommunications technology, electronic medical records (EMR), wearable devices, store-and-forward technology, and mobile health (Health Resources & Services Administration, 2021). Procurement of these and other digital health technologies and products for device demonstration is critical for hands-on instruction in these modalities (FIP, 2021). The use of standardized/simulated patient actors (SPs) to simulate virtual patients in the ambulatory and acute care settings, and even in the community pharmacy setting where their use is traditionally less common, may be of particular help in replicating telehealth practice sites in the actual or virtual classroom or laboratory.

Likewise, simulations that are centered around the development of affective skills in the virtual environment can be beneficial for health professions students. Such skills are especially essential in the telehealth setting, which can be unfamiliar to many patients, especially those who are older or less technologically savvy. Depersonalization of the provider-patient relationship can occur in the telehealth setting due to physical distance, lack of sensory cues, and unclear norms/standards (Gordon et al., 2020; Miller, 2003). Creating simulations that emulate the telehealth setting can provide learners a realistic and safe learning environment to develop self-awareness, emotional intelligence, empathy, and social and emotional competence. These affective skills are pertinent for developing graduates able to build rapport and relationships to set the patient at ease in the virtual environment. Telehealth-based interprofessional education (IPE) may also provide opportunities for students to interact with other health professional learners who are in distant locations. Development of telehealth IPE that centers around topics such as complex disease management, social determinants of health, pharmacogenomics, special populations, quality improvement, and patient safety can enhance students' knowledge of telehealth in modern day healthcare. Also, as standards of best practice for digital health are being adopted, IPE allows for the spread of these practices across disciplines (FIP, 2021).

Choosing the Right Telehealth Tools

Video Conferencing

When developing a telehealth program, there are several considerations regarding choice of modalities. With cost as a primary concern, faculty could consider adopting platforms offered by their home institutions as the center of simulation design. At most US institutions, educators have access to teleconferencing technology such as Zoom Video Communications® (San Jose, CA), Cisco WebEx® (Milpitas, CA), Microsoft Teams® (Redmond, WA), or Skype Communications® (Palo Alto, CA). Most of these products are relatively similar to one another and the choice of tool will depend on the instructor's need for specialized capabilities such as breakout rooms, patient privacy, maximum number of attendees, screen sharing, and whiteboard tools. Clarity of the audio/video may also drive the choice of video conferencing technology, as the simulation may require clear audio and visual cues to collect an accurate history and perform a physical exam. Video conferencing may be an appealing mode for interprofessional learning experiences that simulate multi-disciplinary patient encounters. Depending on the simulation design, it may be prudent to have a waiting room available to allow standardized patients (SPs) to wait for their telehealth appointment or a separate room for the health professional teams to meet to discuss the patient. Other tools such as SimulationIQ® (Exton, PA) may offer a telehealth platform that provides videoconferencing, patient scheduling, and the patient's chart all in one. Regardless of which platform is selected, early involvement of the home institution's information technology (IT) personnel is key to ensure that the telehealth tool is compatible with the current system and any school-sanctioned student devices. Adequate internet connectivity and bandwidth should also be considered and discussed with IT personnel.

Electronic Medical Record (EMR)

Simulated electronic medical records can be easily utilized in virtual learning settings to strengthen multiple clinical skills, with the simplest being care plan development. Choosing the best EMR program for the activity will depend on the way the simulation is designed. Questions to consider include:

1. Is there a need for order-entry and verification capabilities?
2. Is there a need for the ability to document on a medication administration record (MAR)?
3. Is there a need for crisp diagnostic imaging within the EMR?
4. For IPE, do interprofessional teams need to make real-time or asynchronous changes to the patient's record, such as patient documentation, order entry by a provider and verification by a pharmacist, or sign-off by a senior team member?
5. Is the ability to query the EMR for population-health data necessary?
6. Would teleconferencing and group interaction within the EMR help facilitate the simulation?
7. Is there a need for assessment capabilities within the portal so that instructors can easily grade student work?

There are several educational EMR programs on the market and the choice of program will depend on individual needs and cost. One available product is EHRGo® (Duluth, MN), a comprehensive EMR platform that allows educators to use previously developed patient charts, edit existing charts, and build their own patient charts from a blank template. The program has order-entry/verification, provider documentation, group instances of patient charts, electronic prescribing, label generation, structure query language (SQL)-based data querying, and the ability to change the practice setting based on the case scenario. Another web-based program, SimEMR® (Pittsburgh, PA), is equipped with a dashboard that allows instructors to assign activities and manage courses. SimEMR® allows students to chart within the program, navigate through patient data, and submit assignments. EHR Tutor® (Parma, OH) contains prebuilt patient charts, unfolding patient cases, and group instances. The free EMR program, OpenEMR® (Altamont, NY), allows patient scheduling, e-prescribing, and laboratory integration. The comprehensive EMR MedAffinity EHR® (Tallahassee, FL) includes electronic medication administration record (MAR), provider documentation, e-prescribing, and unfolding patient data for real-time updates.

Wearable Devices

Several wearable devices are available for virtual monitoring of patients, including blood pressure, blood glucose, electrocardiograms, and patient weight. This data can be transmitted to the provider for assessment and subsequent development of a treatment plan. In simulated settings, virtual patient data could be provided to students for analysis prior to SP telehealth appointments or for IPE activities that center around developing an assessment and plan based on data obtained from wearable devices. For longitudinal patient cases, data from wearable devices can be sent to the student/team for regular monitoring and assessment. For telehealth simulations, the use of data from wearable devices in conjunction with other modalities can enhance the student experience and better prepare them for clinical practice.

Store-and-Forward Tools

Store-and-forward tools allow asynchronous access to data which is recorded and transmitted to the healthcare professional. This includes diagnostic imaging (e.g., radiographs, computerized tomography scans, electrocardiograms, and echocardiograms), pre-recorded patient interviews/assessments, recorded patient messages, photographs of wounds or dermatologic conditions, retinal images, and medication vials and prescriptions. For simulated activities, store-and-forward tools can allow educators to develop scenarios where the patient case does not require real-time face-to-face interactions with an SP. This approach may reduce the faculty workload and the need for scheduling SPs when resources and manpower may be limited. Some store-and-forward data can be incorporated within the EMR platform for ease of access and to offer a more realistic experience.

Designing the Telehealth Simulation

In the design phase of a telehealth activity, some important considerations include faculty workload, level of learners/participants, activity objectives, availability of SPs and facilitators, budget, class size, the need for IT support, allotted time, and the structure/capabilities of the telehealth platform. As with all simulated experiences, smaller groups with fewer students will allow for more learner participation and learning. Thus, synchronous telehealth simulations with SPs may be more manageable with smaller class sizes, whereas asynchronous simulations with store-and-forward strategies may be easier and more realistic for larger class sizes. For example, asynchronous simulations could center around assessing patient data obtained from the EMR, wearable devices, and/or store-and-forward tools, then documenting a patient encounter or sending a clinical note to a patient or another health care provider to practice written communication skills and documentation.

If the intent of the telehealth simulation is the development of clinical skills, the choice of a synchronous route with clinical data available in the EMR may allow a more authentic simulation. For example, a learner can counsel a patient on how to use an inhaler or glucometer and then incorporate the teach-back method. By asking the patient to summarize key points from the counseling session, the learner may confirm understanding and clarify any misconceptions. SPs can also be useful for professional communication and affective skills development and feedback. For example, they can provide essential practice in obtaining an accurate medical and medication history, delivering bad news, or dealing with an angry patient. Box 1 depicts a sample vignette with an SP. Training students to overtly demonstrate empathy and compassion may allow learners to connect with virtual patients in a meaningful way.

Box 1. Example of a telehealth encounter with an SP

A patient presents to the telehealth clinic with complaints of a skin mole. Students would have access to the patient's chart on the EMR prior to the face-to-face video conference so that the video conference could focus on obtaining a medical and medication history with limited physical exam. In addition to the clinical evaluation, the patient might express worry that the mole may be cancerous, requiring the student to address the patient's psychological concerns in addition to the physical condition.

Telehealth encounters typically include only limited physical exams based on the nature of the platform. When assessment of learners' physical exam skills is desired for educational purposes, however, adjustments to the scenario may be made while using some of the same logistics employed for telehealth. For example, during a video conference with a simulated patient, the learner can verbalize the components of the physical exam they would perform, with the patient providing the findings. While this approach does not permit assessment of the learner's ability to perform the exam skill, it would help to capture their knowledge of which components of a focused physical exam are pertinent in this case, based on the patient presentation and initial findings. This information could be used by the learner to develop a differential diagnosis and initial plan of care. When the need exists to virtually evaluate learners' physical exam skills, the learner could demonstrate on another individual in the household or even a doll or stuffed animal. Faculty can view these sessions live via video conferencing or students can record the session for submission via the course management site, for example, for later review.

Simulated telehealth IPE activities can also be conducted asynchronously or synchronously, with or without an SP, depending on the activity's learning outcomes. Synchronous activities can focus on interprofessional communication and teamwork using video conferencing, and even real-time patient interviewing and assessment if using SPs. Depending on the case scenario and objectives, video conferencing or a telephone encounter can be used. For example, a video conferencing format could mimic a telehealth visit by a home health team, whereas a simulated telephone encounter may be more appropriate and realistic for verbal communication between health professionals, such as a pharmacist intern calling a prescriber for a clarification or recommendation of a medication order.

Asynchronous simulations may be a more feasible option where timing is an issue, since it would eliminate the need for finding a time that works for all programs to schedule synchronous simulations, a common IPE challenge. For asynchronous simulations, educators could use a shared instance of a patient's chart. Teams could make shared decisions in the EMR and document their assessment and plan for the patient (as in Box 2). Students would communicate through computerized provider order entry (CPOE), intervention notes, and/or Subjective, Objective, Assessment, and Plan (SOAP) notes, with no requirement for face-to-face video conferencing.

Box 2. Example of an asynchronous IPE activity

Students receive an EMR containing pertinent patient data and a recording of a history collection and physical conducted by another healthcare professional. Interprofessional teams could meet via videoconferencing technology to collaborate on the care of the patient. These collaborations could occur in breakout rooms during a time set aside by the instructor or students could schedule the video conferences on their own.

Educators can also get creative in using a combination of both synchronous and asynchronous simulations for more complex interprofessional scenarios and to simulate multiple follow-up visits with a patient (as in Box 3). For example, the interprofessional team can meet with an SP in real-time to assess and develop a plan and present subsequent follow-up visits as asynchronous written communications through the EMR.

Box 3. Example of a combined synchronous and asynchronous activity

During a virtual home health visit, a physical therapist recognizes signs of a suspected deep vein thrombosis (DVT) in the patient and wants to communicate this concern to the patient's primary care provider (PCP). An interprofessional telehealth contact can occur while the physical therapist is virtually visiting the patient (synchronously) or the physical therapist can send a clinic message to the patient's PCP after the virtual visit (asynchronously) regarding next steps. After the patient is evaluated and diagnostic testing confirms the DVT diagnosis, an e-prescription for an anticoagulant could be sent to the patient's pharmacy and the PCP could send a message back to the physical therapist regarding continuation of care. Educators can make the scenario as complex as they would like by bringing in additional professions, such as social work, pharmacy, etc.

Standardized/Simulated Patients (SPs)

Standardized/simulated patients (SP) are individuals who are trained to portray a patient, a patient's family member, or even another healthcare provider, depending on the simulated scenario (Lopreiato et al., 2016; Rutherford-Hemming et al., 2019). Many medical schools have programs where individuals can undergo specific training and receive an SP certification (Aranda & Monks, 2020; Lewis et al., 2017). Planning for an SP encounter involves several factors related to how the simulation is designed. Questions to consider include:

1. What is the role of the SP and what demographics are needed to fulfill the role?
2. What is the level of fidelity necessary to meet the learning outcomes and what props may be needed?
3. What is the duration of the encounter?
4. How many SPs are needed to conduct the activity in a timely manner?
5. What are the components of the SP script and which aspects should be shared voluntarily versus only if asked?

6. What are the components of student feedback and will SPs be involved with debrief?
7. What are the components of SP training to prepare for successful delivery of the encounter?

If there are budget constraints that limit hiring of SPs, faculty members can consider asking for volunteer preceptors, faculty, staff and/or advanced learners (upperclassmen) to play the role of an SP. If there is limited manpower for facilitators and SPs, the faculty or preceptor who is facilitating the experience may double as both facilitator and SP. While this could make the grading process more challenging, additional time can be allotted to the encounter.

One of the five domains of the Association of Standardized Patient Educators (ASPE) Standards of Best Practices involves provision of training for role portrayal, feedback, and completion of assessment instruments, all of which are necessary to ensure the intended outcomes of the simulation are met. The other domains involve safe work environment, case development, program management, and professional development (Lewis et al., 2017). Regardless of whether certified/professional SPs or volunteers assist with the simulation, adequate time should be dedicated to orienting the SPs to both the scenario and caveats associated with the telehealth/video conferencing platform being used. Many have grown accustomed to live scenarios and, as such, may be unfamiliar with virtual modalities.

As in the live setting, SP orientation should encompass details of the scenario and patient case, student learning objectives, schedule/agenda, instructional cues, etc., as would normally be conducted for in-person simulations. Training the SP to provide feedback on the student's affective and communication skills can be beneficial in providing insight into the patient experience and the educators should consider bringing the SP in during the debrief session with learners. To address any apprehension with the use of the electronic platforms, it is often helpful to conduct a practice run ensures the SP is comfortable using the platform and allows troubleshooting of potential issues that arise during the practice.

Logistical Considerations for Inclusion of Standardized Patients

Some logistics to consider for telehealth encounters with an SP include enabling a virtual 'waiting room' for the SP, deciding on when/how the SP will enter/exit the virtual room, and whether certain props need to be sent to the SP. If technology is a barrier, some institutions may consider sending a loaner device with the virtual platform or other capabilities installed. To avoid confusion during the interaction, the SP will often change their name on the videoconference platform to the name of the patient and they may even put 'patient' in parentheses after their name. For telehealth-based IPE simulations, it may be helpful for the learners to include their discipline, program, or role on the healthcare team in parentheses after their name on the video conference platform. Camera placement may need to be considered if the telehealth visit involves assessing a patient's movement, such as in a physical therapy simulation. Clear audio may be required for simulations that require assessment of the patient's speech or verbal abilities, such as for speech language and pathology assessments.

If multiple telehealth simulations will be occurring at the same time, it is important to consider the capabilities of the video conference platform and ease of monitoring the simultaneous sessions. Prior to the simulation, reviewing video conferencing etiquette with the learners, either as part of a pre-brief or posted pre-simulation instructions, can contribute to an optimal telecommunication environment (this will be further discussed in the section entitled "Etiquette in the Virtual Learning Environment"). All those participating in the encounter (e.g., learners, SPs, faculty) should also receive basic instruction about the video conferencing platform. An opportunity to practice with the platform, especially if it is not familiar to users, is ideal to allow time to troubleshoot any problems that may arise with audio/video functionality. This would be especially prudent in the case of summative assessments that are to be conducted virtually.

Low- and High-Fidelity Manikins

Mankins may also be used in lieu of or in addition to utilizing SPs in telehealth simulations (Lateef & Too, 2019). Though some learners may prefer SPs over manikins, studies have shown that there is no difference between the two with improving knowledge-based outcomes (Grice et al., 2013). However, it might add more complexity with coordinating schedules, involving simulation lab time, and planning on behalf of simulation operations personnel. The use of manikins and simulation aids (simulaids) may be especially helpful for the virtual teaching of anatomy and physical assessment skills (Weller et al., 2004). When determining the type of manikin(s) to utilize for an activity, the simulation's objectives and desired learning experience or outcomes are important to consider.

Simulations with manikins may also be used to expose virtual learners to common emergency situations or rare, but serious, disease states and scenarios (Malhotra & Kumar, 2021). The fidelity of the manikin refers to the level of realism portrayed within a simulation, which ranges across a broad spectrum that is based on the intent of the activity and setting (Lioce et al., 2020; Lopreiato et al., 2016; Munshi et al., 2015). Several studies report similarly increased effectiveness in enhancing learner experience with both low- and high-fidelity manikins (Massoth et al., 2019). More basic low-fidelity manikins would likely suffice for demonstrating physical assessments and skills that would normally occur in a clinical skills or anatomy lab, such as palpating a pulse, performing a head-to-toe assessment, placing a wound dressing, stabilizing a fracture, performing chest compressions, and demonstrating exercises or physical therapy maneuvers (Nestel et al., 2011). High functioning high-fidelity manikins possess all of the 'bells and whistles' and would be more appropriate for realistic scenarios that require the learner to listen to heart and lung sounds, assess vitals after administering medications, and even to draw blood. High-fidelity manikins usually require a simulation technician to operate and some of them even have voice capabilities where the simulation technician can 'talk' for the manikin. High-fidelity manikins may be useful in simulating telehealth scenarios in inpatient or healthcare facility settings. For example, to simulate a telehealth visit with a patient who resides in an assisted living facility that does not allow face-to-face provider visits, the learner can communicate directly with a manikin with voice capabilities. Otherwise, the facilitator can act as a consulting clinician or caregiver and 'relay' the patient's responses.

Low- and high-fidelity manikins can still be used in the virtual setting, but their use would likely require some improvisations. For example, if the educator wants to assess a learner's knowledge of a procedure that would normally be demonstrated in lab, such as an incision and drainage or securing a fracture in the pre-hospital setting, the facilitator can 'act' as the learner's hands and the learner can provide detailed instructions as to which physical actions the facilitator should perform. Simulations using a high-fidelity manikin can be used to simulate a telehealth appointment or consult in a manner that is similar to telehealth appointments and consults that routinely occur in rural areas lacking certain healthcare specialties. Interprofessional simulations with a high-fidelity manikin could also take place in a hybrid format where some of the learners are on site with the manikin and some participate via video conferencing.

At a basic level, a patient's vital signs monitor may be shown along with images of the patient to cue changes in physical appearance. Most high-fidelity manikin platforms can run without the physical manikin for this purpose. Alternatively, several applications (apps) are available that can mimic a telemetry monitor, or at the simplest level, a document or presentation slide with key vital signs and cardiac and respiratory waveforms could be shared on the video conferencing platform. During the simulation, learners can obtain the patient's history, verbalize a physical exam, and identify interventions while an operator or facilitator responds as the patient and adjusts the vitals based on the planned case scenario and in response to learner actions.

Physical exam findings may also be relayed to the learner verbally or via audio clips (such as heart or lung sounds) that can be played. If faculty or simulation staff can be present in the simulation room, showing the learners a live video stream of the room can enhance the experience and permit learners to participate in the activity. For example, by stating which physical exam skills or interventions the learner would like to perform and how to do so, the faculty or staff present in the room could be the hands of the learner enacting the task, as noted above (Grice at al., 2013). Based on room capacity and the availability of a small group of learners to be physically present in the simulation room, another option could involve dividing the class into sections in which some learners participate live while others view what is occurring in the room via video conference. These viewers can be assigned roles as observers who must present their findings during the debrief. Depending on the number of participants, they may also engage with the live simulation via chat or by unmuting their microphones. In a course with multiple simulations, these roles could rotate with the learners in the room becoming the viewers and vice versa.

Designing Activities That Utilize Manikins

Planning these activities requires additional logistical considerations such as a means of connecting the virtual learners with the manikin and simulation room. Questions to consider include:

1. What are the technical and non-technical skills practiced in the simulation?
2. Does the simulation require low- or high-fidelity manikins?
3. How many manikins will be needed, based on the simulation schedule?
4. Is there a simulation operations specialist available to facilitate set-up and manage/control the manikin?
5. Will training be necessary for faculty involved with operations?
6. What are the costs associated with manikin use and maintenance (purchase, rental, cost-sharing among programs)?
7. Is there adequate space for the simulation to and for storage of the manikin and associated equipment?
8. Will transportation of the manikin and equipment be necessary?

Video conferencing platforms, such as those discussed previously for telehealth simulation activities, may be used concurrently with manikins (as depicted in Box 4). Additional personnel are needed to control the manikin (to elicit a response) and to facilitate other aspects of the encounter. Laerdal's LLEAP® (Stavanger, Norway) simulation software allows instructors to rapidly control a high-fidelity manikin's physiology remotely as long as a simulation operations specialist is available to set up the manikin in its physical location.

Box 4. Example of a synchronous IPE activity

A code blue situation could be called in the midst of simulated interdisciplinary team rounds in a 360-degree virtual room setting. A high-fidelity manikin can be controlled remotely or at the simulation center to depict vitals consistent with cardiac arrest. Learners should quickly identify their roles and begin caring for the patient using the advanced cardiac life support (ACLS) algorithm. Vital signs on the manikin may be adjusted by the faculty or simulation operation specialist in response to simulated administration of medication. This scenario involves a hybrid modality of manikins and augmented reality, as discussed further in the next section).

Virtual and Augmented Reality

Technological advances have led to new simulation opportunities that were once mainly used for entertainment purposes. Augmented reality (AR) and virtual reality (VR) are two methods that may be added to aid in a student's learning and overcome limitations of physical space and location (Lopreiato et al., 2016). The availability of VR has become increasingly more widespread as computers become more powerful and graphics continue to improve.

VR refers to three-dimensional, interactive, immersive environments developed by computer technology to simulate an environment in which the student has a sense of being physically present (Lopreiato et al., 2016; Marr, 2019; Pottle, 2019). Participants may utilize head mounted display (HMD) to engage within an experience. VR is defined by the Merriam Webster Dictionary as "an artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment" (Lopreiato et al., 2016; Merriam Webster's Collegiate Dictionary, 2021, para. 1). However, multiple differing definitions may be found throughout the literature with one simplistic definition stating that it is "a real or simulated environment in which a perceiver experiences telepresence," with telepresence being defined as a "medium-induced presence" (Steur, 1992, p.76).

In contrast, AR combines superimposed computerized images into the real world to depict an environment (Lopreiato et al., 2016; Marr, 2019). AR has also been provided many definitions, with one of the most simplistic being, "the combination of reality and overlay of digital information designed to enhance the learning process" (Berryman, 2012, p.213). AR involves blending real and virtual elements and can be considered as more of an enhancement to live simulation experiences, whereas VR may include activities in which the student is not actually present in the lab or location of the activity (Riva et al., 2016).

There are also varying levels that exist within AR and VR based on immersion (Kardon-Edgren et al., 2019). Mixed reality (MR) combines VR and AR, allowing the user to interact with objects in the real world (Lopreiato et al., 2016; Marr, 2019). Although terms have been used interchangeably in the medical literature, distinctive terminology is increasingly employed as new programs are developed and in demand.

Expansion of VR and AR Opportunities in the Virtual Learning Environment

Several VR/AR platforms are available for training students in various healthcare fields. For example, a Doctor of Pharmacy program that needs its students to develop sterile compounding skills may consider a platform such as the Virtual Interactive Cleanroom® by Penguin Innovations (West Lafayette, IN), which provides a virtual pharmacy interface that allows students to compound intravenous medications including those for chemotherapy. For development of patient communication and medication counseling skills, the Second Life® platform by Linden Labs (San Francisco, CA) allows students to interact with a virtual patient using their own avatar. For development of core surgical skills, Surgical Theatre® by Precision VR (Cleveland, OH) can help trainees understand the nuances of surgery and visualize the surgical path prior to the actual surgery. For development of physical assessment skills in the virtual environment, Shadow Health® (Gainesville, FL) offers a comprehensive health assessment package that allows students to conduct a full physical exam and communicate with a virtual patient. VR can also be used to help learners visualize pharmacologic mechanisms in drug design and discovery (Ventola, 2019).

Platforms that involve interactions with virtual patients show great promise in training undergraduate health professions students and offer a demonstrated benefit in socializing students to their professional roles and allowing them to learn from their mistakes (Peddle et al., 2019). Patient assessments and development of treatment plans through a 'choose your own adventure' style asynchronous software or the use of virtual escape rooms can also serve as meaningful ways to apply key concepts in fun and interactive sessions that bring the experience to life. Some programs are pre-loaded with scenarios and cases that have already been developed, while others possess the potential to build cases tailored to the instructor's learning objectives and the learners' level. In the latter case, implementation would require considerable planning to develop the case and patient script and to test run algorithms that reflect the manifold combinations of potential student responses for each clinical scenario. For this reason, it may not be feasible to implement a new program with new cases in the rapid timeframe necessitated by the COVID-19 pandemic (or similar emergent situation). Sessions conducted via VR/AR platforms may be recorded for asynchronous grading when faculty are not available to attend live sessions.

Selection of VR and AR Platforms for Implementation

The utility of VR/AR has varied among disciplines based on learning objectives and skills performance. There are several VR/AR platforms on the market, as described previously. When selecting a platform for implementation, the core skills that learners need to develop should drive the process. Questions to consider include:

1. What are the technical and non-technical skills practiced?
2. Will the platform be used for formative or summative assessment?
3. Are there scenarios and cases developed within the program or will they need to be created?
4. Will the platform be accessible on student devices or will the school need to purchase devices specifically for this program?
5. How many users may utilize the system at one time?
6. What are the associated costs for the license agreement?
7. What is the duration of each user license (how often will users need to renew)?
8. Will user licenses be paid by the institution or the student?
9. Is the platform compatible with the institution's IT requirements?
10. Is technological support available to users?

If financial resources pose a barrier, use of a 360-degree video may provide a home-grown alternative. This entails filming a 360-degree view of a room to visually depict a nearly three-dimensional space that users can view by zooming in on various aspects of the room, much like a virtual home tour available on a real estate website (Pottle, 2019). For example, if students cannot be physically present in a patient exam room or within a simulation center, this approach can serve as a compromise to help make the situation feel more realistic. However, a limitation is that this becomes a passive rather than active learning experience since students cannot move within or interact with the environment.

Considerations for Successful Implementation of VR and AR

The use of VR and AR provides numerous opportunities for increased learning. Scheduling is one of the greatest challenges when developing interprofessional activities and the use of VR allows flexibility of scheduling. For instance, if teams of students are provided a link to enter a virtual simulation, they may connect using video conferencing technology and record the session during the time their team deems best. Although this will reduce the required amount of time dedicated in a day to that activity, it is imperative that the instructor reduces course load elsewhere to allow students some flexibility to complete the activity. When creating a virtual simulation, it is imperative that the instructor assess the activity for rigor and overall learning experience to ensure that it remains a worthwhile exercise that meets its intended learning outcomes despite the transition to the new virtual environment. As such, comparison of data between delivery of live simulations and VR simulations would be imperative for programmatic assessment and continuous quality improvement that includes plans for enhancement in the next iteration. Although many VR experiences were available prior to the COVID-19 pandemic, its emergent aspects prompted many educators to adopt these forms of learning quite rapidly. It is estimated that 50% of simulation may transition to either VR or AR platforms by the year 2025 (Kardon-Edgren et al., 2019). Therefore, the timing is ripe to provide students with the opportunity to learn in these newer environments and to provide educators with the opportunity to learn to use these novel modalities to inform their teaching moving forward.

As students return to the live classroom environment, further considerations will be necessary to facilitate their compliance with social distancing requirements and associated challenges of space allocation, time to complete activities due to smaller room capacity, and more faculty time for facilitation. For these reasons, performing various face-to-face procedures on patients, standardized patients, and/or manikins may be more cumbersome in the immediate post-pandemic setting, and thereby, less favorable. AR with the use of manikins and computer-simulated patients may become more commonplace to afford flexibility in scheduling logistics and will also reduce variability in student experiences. If VR headsets or head mounted displays (HMD) are necessary, concerns may arise regarding students sharing multiple products or items and the need to sanitize items between encounters, which will require the expenditure of supply funds and time for cleaning. To permit the use of individual VR headsets on campus and at home, HMD or related equipment may become required materials that students must purchase when they are admitted into their post-graduate training program. In such cases, the professional program may select specific types or brands of devices to be used by students and may be able to negotiate reduced rates for bulk orders. Considerations may also be given to having the program purchase headsets or other equipment including laptops or tablets and either lending or providing them to students through an organized process (Updike et al., 2021).

Lastly, problem-based learning (PBL) often utilizes cases to set the clinical scenario for students to work through. Trigger videos are typically short films that stimulate discussion and allow students to work through complex concepts to promote active learning (Nichols, 1994). In health education, the use of trigger videos rather than traditional paper cases has the advantage of better exposing students to clinical cases in a way that requires their powers of observation (Chan et al., 2010) and, therefore, invokes the affective domains of their brains. In the virtual setting, such films could be developed as short vignettes that can augment PBL and class discussions. Manikins can be used in trigger videos to simulate high acuity patients while the students are asked to make real-time decisions regarding their care. This also offers a solution to the time involved in coordination of live simulations while overcoming the accompanying scheduling issues. This is similar in concept to the method used in basic life support (BLS) and acute cardiac life support (ACLS) training, where learners view short vignettes followed by discussion and reiteration of key concepts.

Simulation Debrief in the Virtual Environment

The International Nursing Association for Clinical Simulation and Learning (INACSL) standards for debriefing simulation uphold the evidence that essential learning in a simulation-based experience occurs in the debriefing phase. The debriefing is where the outcomes for the experience should be considered and gaps in performance based on the outcomes and simulation objectives should be identified (INACSL, 2016). Debriefing for an online simulation should mirror that of an in-person simulation in terms of content and process, although more time may be required to manage technical aspects that are not applicable to in-person experiences (Thomas et al., 2021). One way to maintain the interactive nature of the debrief is to recommend that all participants activate their cameras during the virtual debriefing sessions.

The 'communities of inquiry' framework includes the core elements of social presence, educator presence, and cognitive presence. This framework was developed for asynchronous online learning, but also applies to the synchronous experience as well (Cheng et al., 2020). There are barriers to successful debriefing in each of these elements, yet these barriers can be overcome. Barriers to social presence include difficulty interpreting body language, perceived lack of privacy if a learner is participating in debrief in a public space, and reduced group cohesion. Ways to overcome these barriers and to promote psychological safety for participants include the use of verbal cues to help learners feel invited and acknowledged, educators sharing their own experiences, and the use of inclusive language. Barriers to educator presence include technical difficulties with the virtual platform and the mental workload that is involved in working in unfamiliar platforms. These barriers can be overcome by testing the new technology ahead of time, formatting the platform to view as many learners at one time as possible (such as the gallery view in Zoom), and ensuring good visibility and sound quality. Barriers to cognitive presence include learners who are unfamiliar with how to engage with other learners in this environment, difficulty with technical aspects, or a heavy cognitive load when attempting to perform other tasks during debriefing sessions. These barriers can be overcome by sharing expectations for engagement, orienting learners to the platform, using visual aids, or dividing the class into smaller breakout groups.

Games and Gamification

The use of games and gamification in medical education has become increasingly popular over the past decade (Sera & Wheeler, 2017; van Gaalen et al., 2020). Gamification and games can be used to help encourage learners to motivate actions, progress through content, and reinforce behavior and knowledge. While the terms games and gamification are often used interchangeably, there is a difference. Games are self-contained activities that require suspension of disbelief. Gamification for learning is not about using a self-contained game for learning purposes, but rather applying elements of games to learning activities to engage learners (Rutledge et al., 2018). The use of both strategies can encourage and engage interprofessional learners. Various platforms have been used for gaming and gamification in the classroom as a means of formative assessment. Learner satisfaction with gamification is generally high. This section will describe some of the gaming and gamification platforms that are widely used to promote student learning and that can or have been adapted to the virtual environment.

Online programs that apply gamification to learning have become widely used for formative assessment. Some examples of these include Kahoot!® (Oslo, Norway) and Quizlet Inc.© (San Francisco, CA). Prior to the COVID-19 pandemic, these technologies were used in the classroom to motivate students' learning with great success (Ismail, 2019). Once classrooms were moved to the virtual environment, these technologies emerged as a means of engaging learners in the virtual classroom (Kalleny, 2020). These digital game-based platforms have the added advantage that they can provide educators with immediate feedback on the comprehension of the material being taught (Sera & Wheeler, 2017). This is particularly useful when the audiovisual platforms used for virtual instruction make it challenging to detect the learners' non-verbal responses to the delivery of educational content. When used intermittently throughout a virtual class to gauge learner comprehension, this crucial immediate feedback allows the educator to reinforce complex and challenging concepts during class time. The use of online gamification technologies equally engage students in a manner similar to traditional face-to-face modalities, such as lab-based skills sessions (Kalleny, 2020).

An example of an educational game is the virtual escape room. Recently, the use of escape rooms has increased in popularity in healthcare education and has shifted activities to being more learner centered (Guckian et al., 2020). Escape rooms provide a creative method for encouraging individuals to work together to solve puzzles with the goal of escaping the room and advancing to the next step. While escape rooms were initially available commercially for entertainment purposes, the same structure can be applied in the academic environment. Their application to a clinical scenario can promote recall and application of prior instructional material, strengthen skills in problem-solving, teamwork, and communication, and ultimately encourage development of an interprofessional team. During the COVID-19 pandemic, traditional in-person healthcare education escape rooms required modification to allow them to be delivered virtually. The creation of a virtual escape room can be labor intensive and require more knowledge, skills and effort than do traditional approaches to teaching (Cates et al., 2020). When developing a virtual escape room, survey software such as Google Forms® (Mountain View, CA) or QuestionPro® (Austin, TX) can be used to deliver clues to students or a website can be developed with clues embedded in the pages. Students can be placed in breakout rooms on a virtual platform such as Zoom Video Communications® (San Jose, CA) or Microsoft Teams® (Redmond, WA). It works best if each team designates a leader who will share their screen so that the team can work through the provided clues together. Another example of a game is a scenario-based or 'choose your own adventure' game in which the choices that the learner makes at each decision point impact the details of subsequent scenarios. This example is similar to the virtual escape room and can be delivered using survey software or PowerPoint® (Redmond, WA).

Innovative Approaches to Active Learning in the Experiential Setting

Experiential training is essential for all disciplines to hone clinical skills developed throughout the professional curriculum. Environmental and resource restrictions during the COVID-19 pandemic created significant and fluctuating barriers in student access to direct patient care areas, including ambulatory, community, and acute care settings (Fuller et al., 2020). Experiential training, regardless of healthcare discipline, is routinely inclusive of patient engagement/management, interprofessional team integration, and active learning conferences, such as educational seminars, topic discussions, journal clubs, and case evaluations. This section will explore the use of simulation to close the gap created by limited access to clinical environments during the COVID-19 pandemic while assuring achievement of learning objectives.

Hybrid teaching strategies have routinely been employed throughout the COVID-19 pandemic to meet experiential education goals (Badreldin et al., 2020). Simulation modalities have provided methods to apply existing technology to fill gaps created by the interruptions to patient access and assist organizations and students in applying social distancing, particularly for educational forums not involving direct patient care. The interpretation of national and local guidance, such as those provided by the Centers for Disease Control and Prevention (CDC) and by educational and clinical organizations, created a variable and often fluctuating environment. Factors influencing the interpretation included clinical concerns, such as infection control measures and management of contacts with confirmed or suspected COVID-19 patients, and practical ones such as shortages and conservation strategies for personal protective equipment (PPE).

The video conferencing platforms discussed earlier in this chapter have been essential tools to support continued engagement of students through educational meetings, particularly since many organizations have placed firm limitations on in-person gatherings (Almarzooq et al., 2020; DeFilippis et al., 2020). Journal clubs, clinical debates, and seminar/topic discussions can be conducted across large student groups within or across healthcare disciplines by virtual means that support social distancing (Johnston et al., 2021). Learners can remain engaged during these sessions by using various active learning modalities, including online educational games such as Jeopardy Labs® (Vancouver, Canada), Kahoot!® (Oslo, Norway) and others discussed in the gamification section; polling mechanisms such as Poll Everywhere® (San Francisco, CA) and Mentimeter® (Stockholm, Sweden); crossword puzzles; and so on. Groups of precepting clinicians or faculty can share the workload of moderating sessions, thereby mitigating some of the stress of the increased workload created by need for rapid, real-time course re-design and implementation (Moreau et al., 2021).

The CDC compared trends in telehealth encounters for patients in the first quarter of 2019 and the first quarter of 2020 (Koonin et al., 2020). Overall, the number of telehealth visits were 50% higher in the first quarter of 2020 and the last week of the quarter in 2020 alone saw a 154% increase in telehealth visits compared to the same period in 2019. When in-person patient encounters have not been possible, HIPAA-compliant video conferencing platforms have provided methods to discuss and evaluate patient cases through real-time use of electronic medical records (Higbea et al., 2021; Moreau et al., 2021). Such discussions can simulate the pre-round or pre-encounter preparation that students routinely undergo prior to engagement with a patient (DeFilippis et al.; 2020). If remote access to the record is limited by organizational licensure, a moderating clinician or faculty member can navigate the chart at the student's direction. The clinician, who often remains actively engaged in clinical care, can provide clinical assessment or event information to fill any gaps in the charted information when prompted by the student. This format permits for assessment of critical thinking skills, interpretation of clinical information (e.g., data and diagnostics), and medical and discipline-specific knowledge. By students 'knowing what (they) don't know,' articulation of how specific information or assessments can be obtained through interprofessional collaboration also facilitates the student's understanding of the interprofessional matrix and benefit of collaboration. If permissible by the organization, these video conferencing platforms can also provide a method for students to virtually attend acute care rounds or engage in telehealth encounters with the interprofessional team, the patient, and/or their family members. These methods may preserve some of the *ad hoc* learning often lost when the student is removed from the clinical environment (Higbea et al., 2021; Moreau et al., 2021). Additionally, providing students with experience related to telehealth or digital health gives them an opportunity to see how this will be incorporated into practice, particularly to address disparities in care (FIP, 2021).

As discussed earlier in this chapter, simulation using manikins or SPs can also provide a method for students to engage in high fidelity encounters for high risk, high intensity events such as a medical emergency response that cannot be completed at the bedside in the changed environment of the COVID-19 pandemic. Simulation can also expose students to the requirements of working within the stringent infection control environment of COVID-19 patients including donning and doffing PPE and infection control measures. Students can also gain experience with implementing care strategies such as proning (safely turning a patient from their back to their abdomen) that are otherwise rare in most other populations.

SOLUTIONS AND RECOMMENDATIONS

Adaptation of Existing Technologies

The transition to virtual learning has led to enhanced use of capabilities within learning management systems (LMS) to engage students. Institutions may have contracts with various LMS platforms, such as Instructure Canvas® (Salt Lake City, UT), Blackboard Learn® (Washington, DC), and Moodle® (Perth, Australia), that possess common functions for sharing content and maintaining grades. Each LMS also has unique capabilities for synchronous and asynchronous course delivery, such as polling, sharing screens, use of a whiteboard, etc. For example, discussion boards have great utility in the virtual environment, where they provide learners with opportunities to continue dialogue about course content asynchronously. Discussion boards can serve as a platform to clarify key points or have learners contribute to various aspects of a case discussion for more active learning. Participation may be required by the instructor or optional on an as-needed basis. If required, student contributions can be graded directly from the discussion board.

LMS platforms also have various capabilities for breakout rooms or individual channels within a course session to allow for small group discussions or group work. Use of breakout rooms permits synchronous collaboration among students while affording the instructor the flexibility to transition between rooms for observation or to assist students with activities such as case discussions, much like what would occur in a live classroom environment. Instructors can assign or move participants between rooms and call students back into a larger session or reassemble the whole group. Standardized patients can be invited to meet with students in breakout rooms for individualized assessments. Of note, the fact that not all platforms possess the capability for video recording may be an important consideration in establishing formative (student review and self-reflection) and summative assessments (to address any potential grade discrepancies). Such LMS platforms possess mechanisms by which to share portions of case information with students in a stepwise manner for gamification, virtual escape rooms, or assessments by adjusting the time that certain content becomes published or linking a file within the gradebook.

In-video quizzes are another way to keep students engaged during asynchronous delivery of course content (Cook, 2018). Task-based quiz questions can be embedded within the video, prompting the students to apply the material they are learning and to correctly answer the question before they can proceed to the next segment. A brief pop-up explanation can also be provided for immediate clarification. This modality encourages critical thinking through immediate application of learned concepts.

In live settings, students practice clinical skills and undergo assessments using medical devices such as blood glucose meters, insulin pens, or inhalers or task trainers such as airway management heads or advanced venipuncture arms. There are many challenges with obtaining these devices and physically sending them to students during a pandemic, such as limited funds for the purchase, sending, or tracking of devices and limited supplies due to students breaking, losing, or failing to return the devices. Although mailing devices to students during a pandemic is one adaptation that may be used when laboratory time is not possible, provided that resources are available for doing so, adoption of VR/AR may be used instead to augment a student's learning.

Table 2 summarizes the multitude of available technologies discussed in this chapter, categorized by the type of simulation modality. Table 3 summarizes the various available technologies in the didactic and experiential settings with practical considerations when planning for implementation. Factors to consider when selecting an ideal simulation modality include learning objectives, class size, faculty availability, cost, and support (technology or simulation operations).

Table 2. Available technologies

Technology Type	Available Technology
Telehealth platform	SimulationIQ® (Exton, PA)
Academic electronic medical records (EMR)	EHR Tutor® (Parma, OH) EHRGo® (Duluth, MN) MedAffinity EHR® (Tallahassee, FL) OpenEMR® (Altamont, NY) SimEMR® (Pittsburgh, PA)
Wearable devices	Activity tracker (FitBit, Garmin) Smartwatch (Apple Watch, Samsung Gear)
Virtual/augmented reality	Shadow Health® (Gainesville, FL) Surgical Theatre® by Precision VR (Cleveland, OH) Second Life® by Linden Labs (San Francisco, CA) Virtual Interactive Cleanroom® by Penguin Innovations (West Lafayette, IN)
Gamification	Kahoot!® (Oslo, Norway) Quizlet Inc.© (San Francisco, CA)
Games (i.e. escape rooms, 'choose your own adventure')	Google Forms® (Mountain View, CA) QuestionPro® (Austin, TX) Zoom Video Communications® (San Jose, CA) Microsoft Teams® (Redmond, WA) PowerPoint® (Redmond, WA)
Video conferencing platforms	Cisco WebEx® (Milpitas, CA) Microsoft Teams® (Redmond, WA) Skype Communications® (Palo Alto, CA) Zoom Video Communications® (San Jose, CA)
Learning management systems	Blackboard Learn® (Washington, DC) Canvas® (Salt Lake City, UT) Moodle® (Perth, Australia)

Table 3. Suitable technologies/approaches and general considerations

Setting	Technology/ Approach	Considerations
Didactic	Telehealth Platform	● Institutional use ● Synchronous versus asynchronous (store- and-forward) ● Faculty workload, level of learners/participants, class size, and IT support ● Use of other modalities (manikins, standardized patients, point of care testing devices) ● Skill(s) assessed: limited physical exams, communication, medication histories, etc.
	Simulation	● Various modalities (manikins, standardized patients, academic EMR, point of care testing devices)
	Academic EMR	● Need for capabilities such as order entry, verification, and documentation ● Assessment capabilities
	Wearable devices	● Type of data points needed ● Use in small patient case or simulation
	Manikin/Simulaid	● Can be used to: ○ teach anatomy and physical assessment ○ augment simulated emergency situations ● Can be used in conjunction with trigger videos
	Virtual reality/ augmented reality (VR/AR)	● Can be used as enhancement to live simulation (AR) or in place of lab or activity location (VR) ● Several programs depending on intended use ● Implementation into program (class size, scheduling, student workload) ● Cost to implement and maintain ● Need for IT support
	Games/gamification	● Encourage learners to motivate action, progress through content, and reinforce behavior and knowledge ● Selection of method and associated levels of complexity (simple as knowledge assessment versus critical thinking)
	Learning management system (LMS)	● Several tools available within system: discussion boards, breakout rooms, video recording capabilities, in-video quizzes ● Institutional use ● Need for IT support and training
Experiential	Video conferencing platform	Used to conduct telehealth visits, conduct patient rounds, or presentations
	EMR	Pre-round or pre-encounter preparation

Assessment of Clinical Skills in the Virtual Learning Environment

Social distancing requirements during the COVID-19 pandemic have also necessitated the virtual delivery of formative and summative clinical assessments, which has added more layers of complexity (Lara, et al. 2020). Students who may already experience test anxiety or feel overwhelmed in the virtual setting may be uncomfortable with the virtual delivery method or concerned about potential technology challenges. From the faculty perspective, protecting the academic integrity of the examination is an important consideration in ensuring that student performance records are accurate and reliable for progression (Updike et al., 2021). These concerns are especially true for summative or high-stakes assessments such as an objective structured clinical examination (OSCE), which is often resource intensive in regards to development and grading (Chon et al., 2018).

These challenges may be overcome by advanced planning and by considering other logistics to circumvent student concerns. By replicating the same or similar active learning modalities (such as VR, manikin, or SP) and platforms (such as Zoom Video Communications® (San Jose, CA) or Microsoft Teams® (Redmond, WA)) used previously for assessment purposes, the students' familiarity and comfort level will increase. This will allow the students to focus on conveying the knowledge they have gained and demonstrating their competency in the skills learned. Using the same convention for assessment methods will reduce distractions that may detract from the intent of the examination. For example, the same or similar computerized VR simulators that the students used to learn and practice their surgical skills can be used for the assessment. Similarly, students who practiced telehealth clinical cases with an SP via the institution's LMS should also be assessed within the same terms and environment (Silverman & Foulds, 2020).

Academic integrity can be upheld in the setting of virtual examinations by emphasizing clear expectations of students. A variety of cases and scenarios, mapped to the same learning outcomes, can be used for the examination to reduce the likelihood of sharing content among students (Hopwood et al., 2020). Breakout rooms can be set up for individual students and, in the case of multiple components or stations, can be used accordingly. Both passive and active examination stations may be proctored by faculty through video monitoring. To ensure comfort and consistency among faculty members, adequate training on exam structure and any new technology should take place in order to troubleshoot or circumvent unanticipated challenges.

Use of Layered Learning Models

The Layered Learning Model (LLM) recruits upper-level learners (upperclassmen) who have already completed years of training to assist in the teaching and mentoring of lower-level students (underclassmen) (Loy et al., 2017). For example, a fourth-year student may assist a second-year student. This model is similar to the medical model of active learning and has been widely adopted by medical and pharmacy residency programs, allowing residents to participate in precepting and teaching responsibilities. LLM in the experiential setting can take multiple forms based on the institution in which it is used. The typical layout is having the lower-level student report to the upper-level student or resident, who in turn reports to the preceptor. The upper-level student or resident also provides feedback and instruction to the lower-level students, under the supervision and coaching of their preceptor. Benefits of this type of model include improved efficiency in precepting, exposure to teaching opportunities as part of their own training, improved leadership skills, and allowing the preceptor to further expand clinical responsibilities and address related concerns in a timely manner (Loy et al., 2017).

An expansion of the LLM is the use of various levels of learners to teach clinical skills during the didactic curriculum, both in person and virtually. This also provides an opportunity to prepare the upper-level learners for potential careers in health professions education, review previously learned content, and hone their communication skills in providing effective feedback. The LLM in the didactic setting is typically used in conjunction with a teaching certificate program that enrolls residents interested in teaching in didactic settings or precepting in clinical settings and provides clinical skills education within the associated or nearby academic institution. In addition to presenting didactic lectures, residents are typically involved in small group discussions and many of the active learning modalities discussed earlier in this chapter.

Some schools may also have a teaching or education track in which upper-level students can participate in courses that teach clinical skills as teaching assistants. During the early part of the COVID-19 pandemic, there was much discussion about whether these types of programs should continue. However, even in a virtual environment, the use of upper-level learners such as advanced practice students and residents can assist with the delivery of learning activities. One example is having upper-level students and residents act as the patients for SP encounters, which proved to be a necessity in the early days of the COVID-19 pandemic when many of the SPs were uncomfortable with the technologies being used or were not allowed into the classrooms. Another example is having the upper-level learners act as facilitators and guides through virtual discussions of case studies or journal clubs or provide feedback on recorded videos of the students performing certain skills. It is important to note that when using upper-level learners in this capacity, the instructor must ensure that they are capable and prepared with the information necessary and have clear, consistent expectations of the students being observed.

One area where upper-level learners may provide a new viewpoint is on how to achieve stated outcomes of a virtual activity. Since upper-level learners have already achieved the stated outcomes during their earlier training, they can provide insight on strategies that helped them or could have helped them to achieve these outcomes. This allows instructors to focus on the most important components and dedicate adequate time as the transition to virtual learning occurs. This is a valuable insight in a period of time where many faculty members have felt overwhelmed with teaching in the virtual environment. Upper-level learners can also provide real-time assistance in running the activities and providing additional feedback to students. This is mutually beneficial for all learner levels since it affords opportunities to review curricular content. The elimination of travel time to campus may also encourage the involvement of residents and adjunct faculty in providing assistance to students in the virtual environment. As an example, a resident who is located at a practice site more than an hour away from the school may be unable to provide assistance during in-person classes on a regular basis, but might be available to provide more assistance when the classes are virtual or hybrid. This in turn increases their teaching opportunities while providing skilled supervision for the students participating in the activity.

Etiquette in the Virtual Learning Environment

The virtual learning environment requires a unique set of etiquette rules compared to those for in-person learning (Wilfrid Laurier University, 2021). Students bring into the physical classroom norms that have been learned in prior educational settings. Some of these expectations involve dress, engagement, and behavior. There is a precedent for online interaction in social media, which necessitates defining clear expectations for professional engagement and behavior. Rather than the students entering a public space as is done for in-person encounters, the learning environment now enters their own private space. This opens the virtual classroom to potential disruptions from other people, pets, and the physical background. It should not be assumed that familiarity with the internet automatically translates into respectful 'netiquette'.

The fact that the learning environment is entering the learner's personal space may disrupt some norms that may need to be addressed surrounding dress in that environment, as compared to what a learner may wear to an on-campus encounter. There also may not be a space other than the learner's bedroom to connect virtually, so some flexibility about the physical background may be needed. This virtual environment may shed light on disparities that were not previously revealed, such as having the ability to participate in remote encounters in a private space free from distraction. The learner should have permission to leave the camera off if that helps to maintain privacy and minimize distractions.

Another way to foster positive etiquette for online encounters is through respectful and professional communication. Instructors can model this and set clear expectations for learners for interactions in the large group setting, discussion boards or chat functions, and in breakout rooms. Inappropriate interactions or frequent off-topic digressions can be handled immediately by having the moderator or instructor mute disruptive or off-topic participants where this technology is available, yet the issue should be addressed with the disruptive learner and the class as a whole. It is equally important to foster and recognize positive communication, including the use of the raised-hand function or other agreed-upon modality for asking a question. Frequent reminders of respectful communication are necessary, especially considering that other instructors may have different expectations for virtual encounters.

Establishing online etiquette is important to a student's perception of community in online learning (Gallagher-Lepak et al., 2009). Ideally, an orientation session should be used to introduce expectations for virtual encounters. At the very least, the first remote class session should include a conversation about etiquette and professional behavior for encounters in remote settings. Learners could also be asked what they need from the instructor, from other learners, and from themselves to safely participate remotely. For example, they may need to negotiate with colleagues, roommates, or family members for use of shared equipment, bandwidth, or office space during the time period that encompasses any synchronous class meetings. Negotiating a class contract of behavioral standards, processes for receiving feedback on the course as it is being delivered, and class representatives to serve as liaisons between learners and instructors are all tools that support professional communication. It is of equal importance that instructors maintain a professional and inviting teaching environment by establishing a teaching presence and continuing to provide timely feedback. This is critical for learner success in the virtual classroom (Chakraborty & Nafuko, 2015). Establishing a sense of community can be challenging, but it is imperative to increasing student engagement and improving learning outcomes in the virtual environment.

FUTURE RESEARCH DIRECTIONS

The COVID-19 pandemic has been both a positive and negative disruptor of professional education in healthcare professions. Rapid change and the pioneering of new processes were required, particularly in the area of clinical skills development. Some of the changes that were made may become new pedagogical processes in revised curricula after more normal operations resume. Despite new advances in vaccination development and access and public health recommendations, it may take a long time until classrooms can reach the full capacity practiced in pre-COVID times. For this reason, much consideration must be given to the careful scheduling of class sessions to comply with distancing requirements, faculty workload for implementation, and the selection of ideal active learning methods that facilitate the students' completion of learning outcomes. On the other hand, perhaps some students and faculty members may prefer the flexibility afforded by virtual learning and elect to maintain a hybrid form of course delivery. An advantage of hybrid format includes reduced travel time, which may allow for more engagement from clinical faculty who cannot step away from obligations at their practice sites.

As a result of the COVID-19 pandemic, many publications and presentations related to enhanced instructional design and protection of assessment integrity in the virtual environment are already available (Almarzooq, 2020; Badreldin, 2020; Cates et al., 2020; Cheng et al., 2020; DeFilippis et al., 2020; Fuller et al., 2020; Higbea et al., 2020; Lara et al., 2020; Kalleny, 2020; Malhotra & Kumar, 2020; Moreau et al., 2021; Silverman & Foulds, 2020; Thomas et al., 2021; Updike et al., 2021). Future research opportunities may elucidate student perceptions of learning clinical skills within the virtual setting and the corresponding changes to pedagogy even after learners return to face-to-face learning within the classroom setting. Furthermore, it would be interesting to compare outcomes on licensure exams between students among the various settings.

With the evolution of clinical practice that resulted from the COVID-19 pandemic, there are many opportunities for the development of new learning experiences. As telehealth experiences are undergoing exponential adoption, the use of wearable health devices is growing and becoming more integral in ambulatory care. For this reason, students must learn how to interpret the data from these devices, to use it to develop care plans, and to provide ongoing patient education and counseling.

CONCLUSION

With simulation at the cornerstone of clinical skills training, the COVID-19 pandemic has especially catapulted its utilization in the virtual setting (Pottle, 2019). Classroom and clinical site closures during the pandemic resulted in rapid adaptation to develop meaningful ways to engage students in clinical skills training, both in didactic and experiential settings. Despite the hurdles, faculty members stepped up to develop new innovations and to enhance existing content. Lessons learned and feedback obtained from students will be integral in making permanent enhancements as warranted.

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KEY TERMS AND DEFINITIONS

Augmented Reality (AR): A form of computerized technology imaging that allows for overlay of a visual aid to enhance the live environment.

Experiential Education: Immersive learning that occurs in the real-life setting to augment didactic instruction.

Gamification: A form of pedagogy that integrates game design to meet learning outcomes.

Layered Learning: A teaching strategy that utilizes underclassmen, upperclassmen, and post-graduate students or trainees who learn from one another's experience under the supervision of a seasoned practitioner.

Manikin: Full or partial-size body simulator to depict physiologic response in high-fidelity simulations.

Simulation: An encounter or environment that replicates a scenario within a controlled learning environment; followed by self-reflection and debrief.

Standardized/Simulated Patient (SP): A person trained to portray a character or role within a scenario in a repeatable manner.

Telehealth: Use of technology to connect health professionals with patients in remote or distance locations.

Virtual Reality (VR): A form of three-dimensional (3D) technology that resembles a real-life setting, enabling the user to be fully immersed within the environment.

Chapter 13
Got Skills?
A New Era of Developing and Assessing Clinical Skills in the Remote Environment

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ABSTRACT

Health professional education is designed to help learners gain the knowledge, skills, and attitudes needed for practice. There has been extensive reform in health professional curriculums to emphasize the teaching, development, and assessment of clinical skills. As medical education continues to evolve due to changes in healthcare, and with the ever-increasing growth of technology, it is important to ensure that health professional students are ready to practice successfully. Many curriculums have incorporated clinical skills laboratories to provide learners a safe and protected environment to practice those skills necessary for their profession. Thus, students must acquire, maintain, and enhance their clinical skills techniques as they progress in their education and be properly assessed before they approach real patients. The emergence of the COVID-19 pandemic required educational transition to a remote platform, providing both challenges and opportunities for health education. This chapter reviews how remote skills-based courses can teach and assess clinical skills effectively.

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INTRODUCTION

Building interprofessional relationships and clinical skills are integral components of core curricula in health profession's education. With the increasing technology utilized in education during the global pandemic, academicians are at an inflection point maintaining a need to reexamine pedagogical methods in order to teach and assess both basic and complex clinical skills. The transference in both course delivery and assessment methods from traditional, in-person methods to the remote or online environment has created opportunities for healthcare educators to explore innovative and unique ways of effectively developing students' interprofessional and clinical skills. Additionally, this transformation has required educators to adjust their teaching methodology to ensure that future healthcare workers are well equipped with the changing landscape of health delivery.

In response to the global pandemic, educators have been forced to adapt to the new teaching environment, investigating and exploring new as well as innovative methods through technology to instruct; they must also continue to assess health professional students, thus ensuring the ultimate clinical competence to perform specific professional activities and responsibilities. In this chapter, wisdom obtained via experiences and lessons learned across various schools of pharmacy focusing on the weathering of interprofessional and clinical skills development during this transition period will be discussed. We will explore and examine digital tools that have been used in skills development, determining how these tools could be applied to other health professional education programs. With the newer widespread use of technology, we will delve further into potential strategies and best practices, aiming to elucidate what these novel approaches may mean to the future of healthcare education.

BACKGROUND

Traditionally, many programs taught interprofessional and clinical skills conventionally, in-person, at a dedicated practice laboratory or through experiential clerkships (Hao et al., 2002). The global pandemic, with its institutional and state-mandated public health restrictions, forced educators to emergently identify and learn new ways and technologies to deliver, teach, and assess clinical skill performance in this newly developed remote environment. Due to the social distancing requirements during the pandemic, many of the clinical skills that were traditionally learned and performed with standardized or simulated patients had to become virtual encounters (Agu et al., 2021). This has required educators to make it a priority to incorporate the appropriate tools for effective student learning. To optimize clinical skills development for learners, in the remote or online environment, the use of virtual simulation and other platforms such as videoconferencing or telehealth had to be explored and examined (Lara et al., 2020). Designed to assess clinical and theoretical knowledge, one of the most common forms of assessment for clinical skills and professional competence is the Objective Structured Clinical Examination (OSCE) (Harden et al., 1975). This has been used throughout medical education to ensure that the learners are achieving the necessary clinical milestones at various points within their curriculum. During the pandemic, the traditional OSCE has been adapted to a high-stakes virtual OSCE and its success has been documented in the literature (Lara et al., 2020). Several studies have delved into the use of software and digital tools with which to deliver course content, and assessing interprofessional and clinical skills. (Johnson et al, 2021; Watari et al., 2020) For example, some of the simulated educational and learning platforms used through the pandemic which will be highlighted in this chapter include EHR Go™, Simulation IQ™, and MyDispense™

As innovative, state of the art digital learning tools become readily available for higher educational venues, academic institutions need to invest the time and resources to research and adopt novel programs and platforms to transform the learning experience of health professional students. Additionally, educators must assess the effectiveness of such digital programs and platforms to ensure the students' acquisition of clinical skills and progression towards professional competence (McCutcheon et al., 2015). There also needs to be a goal of the academic institutions to providing faculty with the essential development, establishment, and infrastructure to support the usage of these digital software. By integrating some of these digital tools into a curriculum, and simultaneously providing the support system required for students and faculty, academic success within this venue will be inevitable.

TEACHING, DEVELOPING, AND ASSESSING CLINICAL SKILLS REMOTELY

Clinical Competence through Entrustable Professional Activities

Many health professional disciplines have Entrustable Professional Activities ("EPAs"); these are defined as those activities or responsibilities that are specific to that profession, where the learners maintain the ability to perform with reactive, or without supervision (ten Cate, 2013). EPAs provide a necessary link to blueprint activities and skills that are directly related to patient care activities for specific health disciplines. They are intended to translate competencies into clinical practice (ten Cate, 2013; Lau et al., 2020). The initial concept of Entrustable Professional Activities, was created by Dr. ten Cate in 2005; they are further defined as, "Units of professional practice that are independent, observable, and measurable units in both process (with defined beginning and end) and outcome" (ten Cate, 2013). Since their inception, various health fields have worked to incorporate EPAs into competency-based curricula. The requisite bridge to practice allows EPAs to clearly define what tasks healthcare supervisors can expect a trained professional to perform with reactive and minimal, or no supervision.

As discrete units of activities, EPAs are task-oriented, showcasing a workplace activity that is 'entrusted' to trained professionals. For example, accurately obtaining a patient's vital signs is an everyday, workday activity assigned to specified health professionals. Various activities and competencies can be instituted to assist learners in achieving the level of mastery required to be entrusted with that particular activity. Entrustable Professional Activities are essentially a tool that is utilized to properly evaluate competencies by tasks and responsibilities, considering the fact that they are embedded in practice. These EPAs provide the appropriate framework of skills, values, and attitudes with which to evaluate competencies in order to make an entrustment decision (ten Cate, 2013).

Often individual health fields will initiate with a list of EPAs that encompass the daily work operations, as well as the scope of practice for the profession. Various stakeholders both within and out of the profession will help create EPA domains and their related activities. Guidance with respect to the appropriate method of development for curricula should be established and subsequently incorporated in order to implement EPA-based education (Chen et al., 2015). The concept of having general EPAs for a new graduate or resident assists academicians in the specific field to determine how to structure, map, and implement activities in the learning environment in order to determine the requisite level of entrustment for each EPA. Thereafter, academicians are tasked with providing sufficient opportunities for the learner to become ready for that EPA. The EPA is delegated to the learner once the evaluator can attest that the learner requires only minimal supervision in executing the EPA.

Having a branded identity of EPAs for each health profession aids in interprofessional collaboration by ensuring an understanding of each professional identity through the respective roles and responsibilities that are entrusted to each profession. When reviewing other health professions' EPAs, clear lines of synergistic activity, as well as lines of clear delineation can be evidenced with entrustment throughout the patient care process. When reviewing EPA domains of team-based care, maintaining interprofessional activities to ascertain entrustments for items such as transference, consultation, and rounding, are optimal and ideal. This concept of optimizing technology in attempt to connect various health professions provides an opportune environment to assess trust between learners in different disciplines.

While understanding the purpose and usage of EPAs within the health field, a deeper view is required to further ascertain how to remotely develop and assess these activities within the learning environment. Since EPAs are assessed in a wide variety of settings, it is important to have easily accessible and viable tools available in order to evaluate learners in different environments and venues. As learners shift from various levels of trust, there is a need to provide evaluations in simulated scenarios that provide remote yet direct supervision. Evaluation tools must easily and efficiently integrate across the plethora of platforms, including mobile devices, tablets, and desktops.

For this chapter's purposes, profession-specific EPA domains will be grouped into the following categories across the various disciplines: interpersonal and communication skills, professionalism, practice-based learning and improvement, systems-based practice, patient care, and medical knowledge. The majority of health disciplines maintain these six components and are unique to their particular field. Each of the identified EPA domains contains specific activities that can be executed and assessed to a specific degree in the remote or virtual online environment.

Clinical Skills Pedagogy

Teaching clinical skills to health professional students is not only a critical part of their learning, it requires a 'hands-on' approach. As technology continues to advance, and changes in teaching methodology continues to improve, re-evaluating the pedagogy of teaching clinical skills becomes warranted.

One of the most effective approaches is evidenced through Problem-based Learning ("PBL"). This approach assists students with problem-solving and critical thinking, while additionally building teamwork and fostering communication. This particular approach originated in 1969, and has become popular and widely used across many venues within health professions' education (Sahu et al., 2019).

Another efficacious approach is Simulation-Based Learning, which affords students the opportunity to practice their clinical decision-making skills in a ''real - life'' setting, without compromising patient care. Simulations have become a leading tool in supplementing clinical skills training within various health professions curricula (McGaghie et al., 2011).

Shift to the Remote Learning Environment

The requisite clinical skills for performing EPAs are best taught and practiced in-person, as well as applied with purposeful scaffolding of experiences. This is accomplished initially via a simulated environment, and then adapted under supervision within a clinical practice setting. While some of the students had completed their clinical skills at the onset of the pandemic, others had not, hence faculty must consider alternative methods of ensuring adequate competence in the necessary skills across all trainees.

In response to the pandemic, many skills-based course faculties have shifted to a ‘flipped’ classroom model, where preparatory information was provided to the students in advance of the class. Interestingly, some used creative materials to substitute for manikins. Learning the practical procedures are essential for success. Correspondingly, it is important to ensure that we supplement videos and online materials in order to actively demonstrate these skills to the students. Further, when preparing lesson plans, incorporating the use of equipment to students assist in ensuring that those skills are not forgotten.

Innovative Technology and Software for Remote Skills Development

The development of technical proficiency is a necessary skill in providing patient care based on the increased usage of electronic platforms (*Public Health Data Interoperability: Meaningful Use*, 2021). Providing further benefit, by exposing learners to electronic platforms, their abilities to perform entrustable activities in practical settings becomes enhanced. While technology can provide efficiency, there are some implications that can impede patient safety. Hence, increasing students’ exposure to electronic platforms while incorporating and completing entrustable tasks will help to identify pitfalls, and will consequently lead to improvements in patient safety.

With the adoption and development of various technologies available for training and course delivery, it is possible that the manner in which healthcare educators teach and engage with students may permanently change. Many health professions are adding hard or technical skills as an entrustable task within the system, or practice-based categories, as well as soft or interpersonal skills within the interpersonal and communication skills category. To instill the appropriate knowledge, skills, and attitudes for practice, regardless of their mode of delivery, faculty must create innovative techniques in their pedagogies. When focusing on the various health disciplines EPAs, educators must utilize the most consummate virtual platform tool that most appropriately reflects the skill being taught.

There is a plethora of electronic systems to explore. In some cases, electronic health records and platforms that students use within their clerkship experiences offer testing modes,or teaching versions with which to train learners on how to use the system proficiently.

Notably, the field of pharmacy is a highly automated field. In this vein, students require exposure to technical systems in order to reinforce entrustable tasks, such as processing and verifying a prescription order under the practice-based category. While the process and knowledge of verifying an order can be taught without technical tools, it often is disadvantaged in that it omits the hands-on experience obtained by using the designated electronic tool. In utilizing the simulated or actual technology, students can practice EPAs related to accurate medication dispensing in a virtual and safe environment.

Patient care plan implementation and documentation is another crucial communication-based EPA for many healthcare providers. Ensuring that patient care plans and SOAP notes (“SOAP”: subjective, objective, assessment, and plan) are appropriately documented and a skill that can be taught through online platforms including EHR Go™, SimIQ™, or Zoom™. These venues have been increasingly employed at various institutions during the pandemic. Further, these digital platforms encompass the core domains of interprofessionalism between healthcare providers, while simultaneously developing communication skills.

EHR Go™

EHR Go™ is a healthcare simulation electronic health record platform that enables educators to build realistic patient case scenarios that enable students to observe a holistic picture of patient care. While utilizing EHR Go™, students must look through the EHR for relevant information, read progress notes, and look at any pertinent labs and/or diagnostics. Accordingly, the learning experience becomes multifaceted, rather than siloed in singular aspects of patient care. Additional features of EHR Go™ include the review and verification of orders, simulated labeling of prescriptions, inpatient and outpatient EHR, bar coded electronic medication administration records (eMAR), practice management systems, simulation design and scenario build tools, EHR tutorials and training, and clinical care guidelines and best practice resources (*EHR Go*, 2021). Considering the fact that most patients encounter the interdisciplinary model with various providers at some point of their care, EHR Go™ allows students to virtually collaborate with other disciplines, bridging any gaps of care. EHR Go™ can additionally be utilized within and between programs, in simulation, in the classroom/lab, or in practice.

EHR Go™ contains no fee faculty, and students can gain access through subscriptions, which are based on the time spent on EHR Go™. There are seven different subscriptions available; currently, with the shortest subscription is 12 weeks, and is available at a cost of $45 per student. The longest subscription is a three- year program, and costs $285 per student (*EHR Go*, 2021).

SimulationIQ™

Another simulation- based platform, called SimulationIQ™, is available for standardized patient and mannequin-based student training; this assists in enhancing student performance, and improves clinical outcomes (*Education Management Solutions*, *2021*). This type of platform is especially significant in disciplines where hands-on simulation- based training is the 'gold standard' for their education. Patient care skill development, combined with patient safety are the key priorities within this learning platform. In this platform, the student is able to learn from mistakes in a controlled and safe environment. SimIQ™ allows for the development of assessment, diagnosis, communication, and critical thinking skills. Based on the hands-on nature of these skills, SimIQ™ focused heavily on medical, nursing, and physician assistant programs. Additional benefits of this platform include allowing for a more virtual component; other professions that encounter and work with patients may find this platform useful.

SimulationIQ™ provides virtual telehealth encounters with standardized patients. These encounters can be customized to the institution's specific OSCE scenario, pre- and post-encounter documentation, and evaluation rubrics embedded within the education management solution. The institution can work directly with the platform to build out the virtual OSCE environment and timing based on the number of students and evaluators (*SIMULATIONiQ™ Virtual OSCE*, 2021). A case study from McMaster University showcased that the SimulationIQ had the ability to run 1,243 individual virtual case encounters in one day, for 204 students, with 126 faculty and staff (*SIMULATIONiQ™* Virtual Simulation Technology Supercharges Remote, Hybrid, and In-Person Clinical Education, 2021).

There are various tools within this platform that support different disciplines and learning experiences. SIMULATIONiQ IPE™ is a web-based virtual patient training platform that replicates interprofessional disciplines working together on a common case/scenario, or case series (Education Management Solution*s, 2021)*. This feature allows for the collaboration of interprofessional education via either synchronous, or asynchronous practice. SimPHARM™ is another feature of this platform that focuses on virtual and clinical pharmacy simulation. SimPHARM™ utilizes a case-based learning model where faculty are able to create a case for the student to develop a care plan, initiate treatment, and observe the effects of drugs being administered in real time. Students are able to practice their documentation, order laboratory tests, and interact with the virtual patient and team. This virtual platform is valuable for the flipped classroom environment, as it allows students to sharpen their critical thinking skills, while witnessing the immediate action of their clinical decisions. It also offers virtual Objective Structured Clinical Examinations ("OSCEs"). SimPHARM™ is a subscription-based software system that maintains tiered pricing based on the number of users that will be accessing the system.

Pharmacy, physician assistants, physical therapy, medicine, nursing, and dentistry are all disciplines that heavily focus on providing patient care plans, communication, documentation, and interprofessional collaboration. By utilizing EHR Go™ and SimIQ ™, these skills become effectively developed in an engaging and interactive environment. With the wide range of features and tools available through these platforms, institutions can select the features and tools that are best suited to develop and execute their clinical skills and EPAs.

Zoom™, Google Meet™, or Microsoft Teams™

Other key components of health education programs include conducting medication histories, and medication reconciliations, as well as the development of patient counseling skills. These activities are key components of communication and patient care EPA domains. Virtual meeting platforms, including Zoom™, Google Meet™, or Microsoft Teams™, are technologies that allow for live video and teleconferencing. Educators can utilize role play to act as patients, while students practice conducting patient interview skills. Students have the opportunity to role play with each other before being assessed. This venue of live- yet- virtual method of education ensures that the student is receiving the requisite ''real–life'' patient case scenario. Students are able to practice developing a rapport with their patient while additionally honing their communication skills. Students are able to provide medication, patient counseling, and device demonstration, given the patient case. A key feature of Zoom™, Google Meet™, and Microsoft Teams™ platforms is the ability to create breakout rooms. Breakout rooms enable students to be split into smaller groups during the same session, providing beneficial collaboration with each other on projects, such as a patient case, or drug information resource exercises. Further, students are able to simulate an interprofessional medical team by incorporating other health discipline students within the same breakout room. These platforms maintain a myriad of plans that vary in pricing. The relative cost of Zoom™ can vary between $150-$240 per year, depending on the plan that is chosen. The basic plan is free, however it includes only minimal features. Differences between other plans include the number of participants able to be on the meeting, the duration of meeting, and cloud storage (*Zoom Video Conferencing Plan*, 2021). Google Meet™ has three different plans that include the Basic, Essentials, and Enterprise packages. Differences in features include the duration of the meeting, the number of participants, polls and Q&A, breakout rooms,,attendance reports, and google drive storage (*Google Meet,* 2021). Microsoft Teams™ has similar plan options that vary from the basic no cost plan, to $20 per user per month. Differences in the plans include the duration of the meeting, the number of participants, and access to Outlook, Word, Excel, PowerPoint, Publisher, and Access (*Microsoft® Teams*, 2021).

Shadow Health Digital Clinical Experience™

For more 'life-like' interactions containing digital conversations with standardized patients, and opportunities for trainees to demonstrate clinical reasoning skills, Shadow Health™ is one platform that is utilized for the development of these skills. Patient Interview and Physical Assessment are core entrustable professional activities for a variety of health professions and this platform can be used to accomplish these. Virtually, students perform the physical assessment process by selecting different exams, and then interpreting their findings. The platform allows customization of their activities designed to fit the institution's specific learning objectives. While this platform cannot substitute live patient interviews and physical assessment evaluations, it does provide a virtual avenue with which it introduces learners to these skills using summative and formative feedback.

Pharmacy Specific Virtual Platforms

Specific to the medication use process, and the associated skills, MyDispense™, Pharmacy Simulator™, and Pioneer University™ are strong examples of educational platforms that may be utilized to assist students in developing these skill sets.

MyDispense™

With the plethora of digital platforms available to emphasize team collaboration, other practice-based EPAs remain vital, including medication appropriateness, medication errors, and medication dispensing/verification. MyDispense™ is an interactive virtual community and hospital practice environment that allows students to develop skills engaging in a complete dispensing experience by simulating patient scenarios, barcodes, labels, and products. This platform focuses on student communication between the patient and provider, while developing best practices for safe medication dispensing(*MyDispense*, 2021). Following each exercise, students are given immediate feedback with respect to their dispensing performance. By practicing safe dispensing, students are able to discover if there are any medication errors or omissions within a patient's profile. MyDispense™ is free, and is available to anyone, however it requires integration with the associated institution's web domain.

Pharmacy Simulator™

Another digital software program that supports and prepares students for professional practice is Pharmacy Simulator™. Pharmacy Simulator™ is a 3D simulated learning venue where a variety of educational tools are utilized. These realistic environments demonstrate a 3D pharmacy, community clinic, or hospital. Traditional pen and paper- based scenarios are incorporated into this platform. In this platform, a student reviews a patient scenario, and then completes a form indicating what pertinent questions should be asked, and what actions should be taken. Another beneficial feature is that a more realistic environment is imitated via role playing; students interact with simulated patients to perform a mock patient encounter. Depending on the students' responses, patients respond in a realistic manner, allowing students to work on enhancing their communication skills. With a debriefing session after every exercise, students are able to receive immediate feedback from the facilitators regarding the patient encounter. A dispensing computer feature allows students to review patient notes, and to practice safe dispensing in a digital format. Pharmacy Simulator™ is available for a one- time fee of $50, for one individual person. It also maintains an option to purchase the platform for one, or six months, or one year, with a lower cost depending on which time frame has been selected (*Pharmacy Simulator*, 2018).

Pioneer University™

Pioneer University offers a virtual private network ("VPN") of its pharmacutical dispensing software to Schools and Colleges of Pharmacy. This software provides exposure to the functionality of processing medication orders and creates electronic care plans on their live platform PioneerRx. This system is used across the United States in various independent pharmacies. The tool utilizes a VPN to access the dispensing system. Since the platform is not only web-based institutions are required to ensure that their firewalls allow access to the VPN. Upon granted access, the software system's components can be accessed virtually, enabling students to practice their medication dispensing skills. Pioneer also provides simulation workbooks and faculty guides to assist with planning activities within the virtual environment. Access to the VPN for Pioneer is currently free, but additional student and faculty workbooks can be purchased at an additional cost (*PioneerRx University*, 2021).

Considerations for Adoption of Virtual Platforms

Colleges and universities need to consider the cost of such programs when planning students' clinical skills development, including adding various technologies as a course fee (similar to textbooks), laboratory fees, or incorporating it into the department's budget. Pricing for vendors may depend on the size of the class, or flat rates per institution. Some vendors have specific timeframes for pricing, including half of one semester, or the entire semester. When weighing the cost of a product, it is important to consider what student and faculty technical support is or will be provided, ease of use, assessment reports, feedback, and available upgrades to the program. Many academic institutions have funding sources which cover the technology pilots through innovation awards, state grants, or other means that could actually cover the entire cost of the software.

By utilizing these unique virtual, online platforms in higher education, students can practice a variety of critical skills, while also experiencing the art of practice in a simulated, professional setting. These digital platforms have provided novel opportunities for innovation among educators of various health care disciplines and have allowed for the discovery of state-of-the-art academic resources and strategies for enhanced success in education.

Given the historical nature and structure of the traditional educational system that has existed worldwide, these remote venues are directly linked to the need to obtain adequate knowledge of the instructional material and at the most basic level, the need to adopt this new 'language' of teaching remotely by faculty, which can be rewarding yet overwhelming. Based on the plethora of venues available, it becomes difficult for a faculty member to decipher the most beneficial one to use. Apart from institutional resource limitations, whether it be human or costs, somewhat mitigating this challenge is the fact that the most important ingredient in selecting an appropriate and effectual platform is maintaining an accurate and precise understanding of what skills and competencies are required. Of tremendous benefit is the ability to network with colleagues in the field and attend professional conferences, which enables faculty members to become exposed to the tools and resources available via 'word of mouth'. Faculty are able discuss with other colleagues both the advantages and disadvantages of the platform, including what venues they have used, and with what level of success prior to adopting a certain platform. Once a platform is adopted, there is still a need to adjust and refine the system based on the needs of faculty and students, as well as its capabilities in order to utilize a program to its full potential.

Furthermore, these online platforms are not only being utilized within education fields, but they are being utilized in other forums as well, including healthcare with the rise of telehealth, for example. Resultantly, it has become essential for faculty, as well as leaders from all organizations, to understand the needs of the end users who will be utilizing these state-of-the-art technology platforms, most especially in regard to their training. This poses another challenge, as the training itself is primarily remote and faculty must be swift to learn before integrating in the classroom for teaching and/or assessment purposes.

Assessment of Clinical Skills

Assessment of skills in medical education can be facilitated through performance- and competence-based evaluations (Fastré et al., 2010). Performance-based evaluations measure a student's ability to complete pre-specified tasks and are a method for learners to demonstrate their knowledge, skills, and behaviors in real-world scenarios (Fastré et al., 2010). Performance-based evaluations focus on individual outcomes with limited assessment of critical thinking or clinical reasoning. During this type of assessment, students continue to develop as practitioners, learning to master these skills separately prior to assembling them to fulfill a competency. Competence-based assessments focus on what the learner can do, and the competencies necessary to be successful in their field of study. These components are independent of individual tasks and require a higher level of mental effort (Fastré et al., 2010). During this type of assessment, students integrate their learning experiences in order to complete their competency and work toward mastering the acquired skills, abilities, and knowledge. A direct link exists between how a student performs, and what the student is able to do. Performance- and competency-based assessments in healthcare education traditionally rely on the observation of knowledge, skills, and attitudes by faculty and other medical experts. Evaluation in this setting requires demonstration and visualization of skills, and behaviors that are not readily assessed by written examinations (Fastré et al., 2010).

The assessment of complex cases, procedures, and other areas of competency require the evaluation of a variety of knowledge, skills, and attitudes (Chuan et al., 2018). This necessitates specialized attention to the purposeful scaffolding of skills and assessment against predefined learning objectives. Performance-based evaluations assess individual tasks that build in order to achieve a level of competency (Chuan et al., 2018). There currently exists a shift in education toward competency-based evaluation, yet skills must be evaluated prior to aggregating toward full competency. This is conducted throughout medical education through skills-based assessment. For example, when students are asked to evaluate a patient for heart failure, they must first be able to perform a physical assessment, communicate effectively with the patient regarding signs and symptoms, review current medications, and evaluate patient-specific laboratory findings. Each of these tasks has an associated individual skill set that must be evaluated prior to fulfilling the overall competency of assessing the patient. Faculty must align their assessments to ensure adequate evaluation of individual tasks before adding other tasks for competency-based assessment.

Standardization and validation of assessments used in medical education are imperative and must be considered when being implemented into the curriculum. There are several challenges associated with validation that maintain limited access to standardized rubrics for the assessment of both hard, technical, soft, or interpersonal skills.

Remote Assessment

Concepts such as inter-rater reliability, script concordance, and Think Aloud protocols help to validate these assessments, but necessitate increased faculty workload and time to implementation (Min Simpkins et al., 2019). Competence-based assessments can be difficult to validate considering the fact that it is not one well-defined skill that is being evaluated, but instead a combination that involves an understanding of the case and/or problem, and the ability to synthesize knowledge with which to solve the questions and competency at hand (Min Simpkins et al., 2019). Assessments can be performed in a virtual environment however faculty must provide opportunities for graders to practice with the assessment tools. Further, they must maintain the ability to ask questions and seek clarification in order to maintain validation and inter-rater reliability.

With the transition to virtual assessments, formative and summative authentic assessment methods must be analyzed in order to confirm competency and academic integrity in the remote environment. Careful consideration must be made regarding whether previous rubrics created for in-person encounters are adaptable to virtual environments, and if they provide timely and detailed feedback to learners. Rubrics must fit the focus of the activity and adapt to both synchronous and asynchronous assessments. For example, nonverbal expressions were traditionally a component of many skills-based rubrics. However, with the use of technology, these nonverbal expressions are more difficult to differentiate. The use of virtual technology also opens additional needs and opportunities in the area of assessment. This may include the use of the technology itself, and the ability to build and maintain patient and health team rapport in this setting. Yet regardless of the assessment method chosen, it is imperative that these tools continue to adhere to the pedagogical intent, and that they evaluate the intended skill set appropriately.

Educators are also tasked with reflecting on which skills are better taught and assessed in-person, and those that could or should remain in a remote environment. Ongoing concerns continue to exist over the importance of human interactions in a safe, low stakes educational setting prior to direct application within a clinical practice. Licensure in many health disciplines requires students to be entrusted with skills-based activities specific to the profession. Introduction of concepts may be best taught online; yet, the focus must rest on the appropriate assessment of learning outcomes in high stakes settings prior to direct patient care. By gaining an enhanced understanding of the available tools, as well as the successful strategies and challenges that are inclusive of the implementation, it becomes plausible to enhance and improve the building of new approaches for skills- based learning within this novel digital era. Direct communication with preceptors and student self-assessments during clinical practice will become critical as programs reflect on the mastery of clinical skills within the virtual setting. Assessments of student motivation, the achievement of outcomes, licensure, and board certification will aid in future evaluation of such programmatic changes.

Various publications have highlighted the challenges and opportunities that virtual skills assessments can provide. A systematic review performed by Coyne et al. highlighted the utilization of virtual skills assessment in health education from the period 2008 to 2020 (Coyne et al., 2021). It was determined that virtual simulations provided a safe practice environment for complex health situations. Although this method does provide a viable opportunity for the evaluation of students' clinical competencies, there were challenges associated with the management of both students and the debrief. The authors also emphasized the need for both authentic experiences and learner reflections. Setrakian and colleagues took virtual education one step further through the use of a virtual patient (VP) assessment software (Setrakian et al., 2020). Findings from this study suggest that a VP assessment software can be programmed to provide evaluations similar to that of clinical educators through 4 domains of taking a medical history: breadth, depth, logical sequence, and interviewing technique. The authors highlighted the ability of the VP to address soft skills, including 'picks up verbal clues' through programming the patient to provide verbal clues, and evaluating the learner's response through behavior assessment. Although this specific example provides information regarding formative assessment, there are opportunities for educators to utilize this framework for summative assessment with other educational tools. Additional literature supports the learner's ability to transfer learned skills, such as motivational interviewing from a VP assessment to human standardized patients with skills maintained over 3 months (Reger et al., 2020).

Academic integrity in the remote environment is a fundamental component when assessing competence and learning. Beneficially, this is less of a concern as it relates to skills development and assessment, as students are traditionally able to access their notes and literature with a focus on the skill and communication with other healthcare providers or patients. Emphasis continues to be placed on the ability to apply didactic knowledge in a clinical scenario for patient-specific care, rather than the ability to recall specific information. Development of rubrics that focus on individual student application versus acquisition of knowledge stress the importance of appropriate referencing with recommendations that will prove vital, given the continual shifts in learning.

Medical education has traditionally focused on the student's mastery of hard skills, defined in literature as job-specific knowledge-based competencies, and psychomotor technical tasks. While there is an emphasis placed on softer skills, including communication, professionalism, and leadership, the majority of the curriculum remains heavily weighted on hard skills (Farcas & Azzie, 2020). Proper assessment of hard and soft skills is required to meet accreditation standards and will prove essential in building a well-rounded healthcare practitioner who is able to practice at the vanguard of their license.

Hard Skills Assessment: Patient Care, Medical Knowledge, Practice-Based Learning, and Systems-Based Practice

The first set of assessment strategies to be reviewed in this section will evaluate the skills termed 'hard skills.' These skills include categories including physical assessment, physical examinations, patient care notes, evidence-based practice, knowledge, diagnostic tests, and critical thinking. These assessments are objective in nature and are typically what are envisioned when discussing assessment in healthcare education. In each category, students are taught the best practices, and are able to showcase their knowledge and performance through direct objective assessment measures. As stated previously, it is extremely important to scaffold the assessment of these skills. When skills are initially taught, emphasis should be placed on assessing one skill independently, and mastering that skill or activity prior to moving on to comprehensive assessments and entrustable decisions.

Simulations

Simulations are utilized in medical education to assess hard skills, as they provide students the opportunity to practice their skills by mimicking 'real-life' scenarios in low-stakes environments (Fidler, 2020). The Society for Simulation in Healthcare (SSH) defines simulation as, "The imitation or representation of one act or system by another" (Fidler, 2020, pg. 810). There are several types of simulation that can be incorporated into the curriculum; these include student interactions with virtual software systems, manikins, and/or standardized patients (Fidler, 2020). Incorporation of each of these types of simulation is important as we introduce, develop, and master tasks associated with hard skills.

Game-Based Assessment of Foundational Knowledge

Assessment of foundational competency including knowledge, skills, and attitudes in large-size classes can prove challenging in medical education (Charlier, 2011). Concepts are introduced with the need for direct application and formative assessment. Game-based assessments are interactive, motivating, and challenging to students. Students are given real-time feedback, with the ability to integrate and demonstrate their knowledge and skills (Charlier, 2011). Competition allows for intrinsic and extrinsic motivation in a low-stakes environment. Studies have shown that games serve as a valid alternative to summative assessments. Integrating board games, including Kahoot!, Quizizz, or puzzles into the curriculum have additional benefits, as they may decrease faculty workload and provide the opportunity for less stress and anxiety, while continuing to challenge student learning.

Incorporation of game-based computer technology simulations have been shown to accelerate learning, increase motivation, and support the development of higher order cognitive thinking skills (Yeo et al., 2020). Computer-based simulation games provide a risk-free environment while maintaining a high level of realism that connect the students to the setting. Using games in this manner assists in improving patient safety and application of didactic knowledge, while simultaneously decreasing the need for high-fidelity manikins, and expensive simulation laboratory facilities and tools which increase the cost of training (Yeo et al., 2020). Each of these tools can be utilized in a virtual environment, and can work to augment learning, demonstrating competency in a fun and motivating environment.

Virtual Patient Simulation Programs

Virtual patient simulation programs are often used when concepts and skills are initially introduced to students. These programs allow students to practice their skills independently, and at their own pace (Pottle, 2019). Essentially, students are given autonomy to use their skills and learn from their mistakes in a low-stakes environment. Programs such as Shadow Health Digital Clinical Experience (DCE) are web-based, virtual patient simulation programs that allow students to interview, examine, document, and reflect on their experiences. In their encounters, they communicate directly with a digital standardized patient (i.e. avatar). Students utilize virtual equipment to perform physical assessments, and evaluate patient findings (Pottle, 2019). Faculty can then use these assessments to emphasize the importance of self-assessment, and to provide detailed, direct, and timely feedback with limited workload.

Virtual reality simulation training has been incorporated into several curricula, as this can supplement, or even replace conventional patient-based training. Virtual reality is cost-effective, repeatable, and standardized for on-demand training (Pottle, 2019). Virtual reality technology has rapidly evolved, and is used in areas such as gaming, aviation, military training, education, and simulations of surgical procedures. Healthcare virtual reality can be used in high-risk environments to assist students in acquiring skills within a safe environment. Some virtual reality systems include automatic recordings for quantitative performance evaluation (Bracq et al., 2019). The use of virtual reality in a virtual setting has several challenges: there are limited studies utilizing virtual reality for formative and summative assessment outside of the classroom due to the individual costs associated with each platform. García-Bravo et al. (2020) published a study in which patients with ischemic heart disease utilized virtual reality software through XBOX One™ consoles and Kinect™ sensors as part of their cardiac rehabilitation program. Results of this pilot study showed patient health outcomes were improved,and maintained an additional benefit of increased compliance and patient satisfaction (García-Bravo et al., 2020). There are several virtual reality applications that students can download that are no cost on their smartphones; however, most of these venues focus on soft skills and behaviors. Programs including Virtuali-Tee by Curiscope, or Code Blue VR help students work through interactions that can take place at their home with minimal assistance from faculty. Faculty should continue to explore programs that students can use at home that would assist in better simulating encounters and skills for real-time assessment.

High-Fidelity Simulations

High-fidelity simulations provide an alternative assessment approach that enhances the preparation of students in applying skills prior to entering into clinical rotations, and working directly with interprofessional healthcare teams (Labrague et al., 2019). There are three types of simulation-based activities: low fidelity, mid-fidelity, and high-fidelity. Evidence has shown that high-fidelity simulations are an effective, complementary teaching strategy used for direct application and evaluation of skills (Labrague et al., 2019). It should be noted that the utility of such simulations proves challenging in a virtual environment. Faculty can work directly with the high-fidelity manikins via different platforms; however, any direct application from the student is limited. Interactions with the manikins may be unavailable; yet students can instruct the faculty on what the next steps would be in an assessment and/or evaluation of the patient. This may still prove beneficial as students walk through the process and envision the setting while viewing the high-fidelity manikin.

Objective Structured Clinical Examinations (OSCE)

Objective Structured Clinical Examination (OSCE) is an evaluation tool that measures clinical competence focused on outcomes through observable behaviors (Harden et al., 1975). This type of assessment is utilized for both formative and summative evaluations (Hopwood et al., 2020). When conducting OSCEs in a virtual environment, it is vital to preserve the core components of normal face-to-face interactions by having students assessed on clinical communication skills, written communication skills, practical skills, and professionalism. In this vein, faculty should consider the purpose of the assessment, number of students, skills that are being assessed, resources available, and time constraints (Hopwood et al., 2020). Emphasis should be made on ensuring students and faculty have working audio and visual components prior to the assessment. Students have found it helpful for faculty to create breakout rooms so information can be shared in the 'waiting room' as a pre-encounter prior to entering into the 'exam room' for the start of their examination/encounter. It is important to provide as realistic and practical a setting as possible (Hopwood et al., 2020). Consideration should be made to change the clinical setting to a remote telehealth consultation, or virtual rounding experience. This could mean that the original roles of standardized patients may need to shift in order to accommodate for changes. Additionally, it is important to schedule time for the students to practice with the format, especially in light of the usage of a myriad of platforms. Further, it is important to maintain consistent platforms whenever possible to assist in alleviating stress, consequently allowing for the focused assessment of skills and knowledge (Hopwood et al., 2020).

Pitfalls

As addressed above, each of these assessment strategies can be incorporated into some part of a virtual environment. Scaffolding the assessments and allowing practice with low-stakes activities will help students feel comfortable with expectations and will assist in building their confidence and competence in mastering their predetermined objectives. One of the most challenging aspects of virtual assessment is the inability of physical contact, and the application of physical assessments and examinations. Activities including clinical procedures, surgeries, physical assessment, and physical examinations can be first taught and preliminarily assessed in the virtual environment, but they must then be fully assessed in person, prior to direct patient care on experiential rotations.

Soft Skills Assessment: Interpersonal and Communication Skills and Professionalism

It is essential that health professional students develop communication skills and professionalism during their didactic training (Cowen et al., 2016). The ability to provide effective communication is a vital skill for healthcare providers; this is precisely the reason that health professionals' programs focus on interpersonal and communication skills as part of training for essential competencies (Baig et al., 2009). Key components for health patient encounters are outlined in Table 1 (Makoul, 2001). These elements can be used as a blueprint for medical curricula regarding both training in communication skills, and subsequent student assessment (Duffy et al., 2004; Joyce et al., 2010). Transition or new development of an assessment tool, such as a rubric for virtual learning experiences, should retain most, if not all, of these components.

Table 1. Seven key elements for effective patient communication

1. Building relationship 2. Opening discussion 3. Gathering information 4. Understanding the patient's perspective 5. Sharing information 6. Reaching agreement 7. Providing closure

Source: (Makoul, 2001)

Assessment tools should be built to reflect discipline and programmatic expectations that support learner development and awareness. These tools provide support to the learner and associated education program in various ways (Bergus & Kreiter, 2007). First, they provide learners with the awareness of the importance of patient communication, including expected competencies for effective encounters. They allow educators to identify and delineate learner deficits, which may simultaneously reveal existing weaknesses within the current curricula. Finally, summative assessments for communication and professionalism may prevent learner progression within the curriculum, which may prevent future patient harm (De Haes et al., 2005).

Communication skills are often incorporated within assessment tools that assess clinical tasks. For example, communication and clinical skills are evaluated within OSCEs involving standardized patients (Bergus et al., 2009). However, there are some OSCEs that focus solely on communication skills (Baig et al., 2009). Various rating scales have been utilized to evaluate learner communication skills within an OSCE (Baig et al., 2009; Reznick et al., 1997).

A fundamental requirement for a quality competency test is to establish content validity, which can be accomplished via the three steps outlined in Table 2 (Newble, 2004). It is worth noting that learner performance in one area is a poor predictor of performance within another area, hence, a wide array of evaluations should be included across a curriculum to support both content validity and reliability.

Table 2. Establishing content validity

Developmental Steps	Details and Examples
Identify problems and/or conditions learner must be competent in, such as the EPAs	Based on: Opinion of expert groups Formal studies (observation and analysis)
Define tasks learners must be competent in, such as EPA tasks	Examples: Taking history from a patient Performing and interpreting tests Educating patients
Create a blueprint that maps general competencies to be tested with the problems and/or conditions in which the competencies will be demonstrated	Example: Communication Skills for a Cardiovascular patient presenting with angina

Source: (Newble, 2004)

Reliability within an OSCE faces various challenges. Checklists (Figure 1) were initially used to assess completed activities with the intention of increasing inter-rater reliability, and removing subjective bias by evaluators (Reznick et al., 1997). However, issues of trivialization and scores that did not reflect learner performance arose (Williams, 1994). Including criteria that are easy to define and measure, but omitting those that are not, or the assigning of inappropriate score weighting for tasks may communicate to the learner that certain items are not important. Hence, providing the learners with checklists can guide their training, although tools not developed appropriately can redirect the student's focus from their tasks to alternatively focus on how to practice for an optimal OSCE score (Van Luijk et al., 1990). Finally, there are additional concerns that checklists may evaluate; thoroughness instead of competence may not delineate learner performance and may not allow for alternative approaches to problems (Martin et al., 1997; Norman, 1993; Norman & Feightner, 1981). In response, a shift has occurred from checklists to global rating scales, as shown in Figure 2, which can be equal, if not more reliable (Regehr et al., 1998; Reznick et al., 1997). Global rating scales consist of defined dimensions related to the assigned task, and each dimension is evaluated on a provided scale. The best approach for assessment of soft skills may be a combination of the utilization of both the checklist and the global rating scales, depending on the activity. For example, checklists may be appropriate for certain skill stations, while global rating scales may be best suited for communication skills. Regardless of what type of assessment is utilized, it is imperative to evaluate whether the learner's score reflects the true level of competence on the assigned task.

Figure 1. Example of a task-specific checklist for OSCE
Source: (Reznick et al., 1997)

STATION3

SMALL BOWEL ANASTOMOSIS

INSTRUCTIONS TO CANDIDATES

You have just resected a segment of small bowel. Perform a single layer, interrupted, end to end anastomosis to restore continuity

ITEM		Not Done or Incorrect	Done Correctly
1.	Bowel oriented mesenteric border to mesenteric border, no twisting	0	1
2	Stay sutures held with hemostats	0	1
3.	Selects appropriate needle driver (Gen surg, medtip/med or short length)	0	1
4.	Selects appropriate suture (atraumatic, 3.0/4.0, PDS/Dexon/Vicryl/silk)	0	1
5.	Needle loaded 1/2 to 2/3 from tip	0	1
6.	Index finger used to stabilize needle driver	0	1
7.	Needle enters bowel at right angles 80% of bites	0	1
8.	Single attempt at needle passage through bowel 90% of bites.	0	1
9.	Follow through on curve of needle on entrance on 80% of bites	0	1
10.	Follow through on curve of needle on exit on 80% of bites	0	1
11.	Forceps used on seromuscular layer of bowel only majority of time	0	1
12.	Minimal damage with forceps	0	1
13.	Uses forceps to handle needle	0	1
14.	Inverting sutures	0	1
15.	Suture spacing 3 to 5 mm	0	1
16	Equal bites on each side 80% of bites	0	1
17.	Individual bites each side 90% of bites	0	1
18.	Square knots	0	1
19.	Minimum three throws on knots	0	1
20.	Suture cut to appropriate length (does not interfere with next stitch)	0	1
21.	No mucosal pouting	0	1
22	Apposition of bowel without excessive tension on sutures.	0	1
MAXIMUM TOTAL SCORE			(22)
TOTAL SCORE			
EXAMINER			

The transition to, or initiation of virtual assessment for soft skills, can often maintain most of the same elements of face-to-face assessments, provided the activity utilizes technology to allow for the visualization of the learner. This can be achieved via pre-recorded videos, or real-time interpersonal encounters with a standardized patient/practitioner. The purpose of the activity should guide which format is the most appropriate.

Pre-Recorded Videos

In order to provide learners with an educational experience that is more focused on the delivery method and content, and less focused on the interpersonal engagement, pre-recorded videos may be utilized asynchronously. This may provide a low-stakes learning experience that supports continuous, repetitive adaptation. The learner may upload this recorded video for review and assessment by a peer or faculty

Figure 2. Example of a global rating scale for OSCE (Reznick et al., 1997)
Source: (Reznick et al., 1997)

GLOBAL RATING SCALE OF OPERATIVE PERFORMANCE

Please circle the number corresponding to the candidate's performance in each category, irrespective of training level.

	1	2	3	4	5
Respect for Tissue:	Frequently used unnecessary force on tissue or caused damage by inappropriate use of instruments		Careful handling of tissue but occasionally caused inadvertent damage		Consistently handled tissues appropriately with minimal damage
Time and Motion:	Many unnecessary moves		Efficient time/motion but some unnecessary moves		Clear economy of movement and maximum efficiency
Instrument Handling:	Repeatedly makes tentative or awkward moves with instruments by inappropriate use of instruments		Competent use of instruments but occasionally appeared stiff or awkward		Fluid moves with instruments and no awkwardness
Knowledge of Instruments:	Frequently asked for wrong instrument or used inappropriate instrument		Knew names of most instruments and used appropriate instrument		Obviously familiar with the instruments and their names
Flow of Operation:	Frequently stopped operating and seemed unsure of next move		Demonstrated some forward planning with reasonable progression of procedure		Obviously planned course of operation with effortless flow from one move to the next
Use of Assistants:	Consistently placed assistants poorly or failed to use assistants		Appropriate use of assistants most of the time		Strategically used assistants to the best advantage at all times
Knowledge of Specific Procedure:	Deficient knowledge. Needed specific instruction at most steps		Knew all important steps of operation		Demonstrated familiarity with all aspects of operation

OVERALL ON THIS TASK, SHOULD THE CANDIDATE: FAIL PASS

at a later date. It remains important to remember that timely feedback should be provided in an effort to allow the learner to make necessary changes prior to the next iteration or experience that may require competency in this skill set. (Asan & Montague, 2014). Should these experiences build up to a final, high-stakes evaluation, it is important to utilize the same assessment tool throughout all sessions in order to promote learner success. Video recordings are beneficial since they promote self-evaluation and reflection, they capture activity allowing for multiple reviews, they may increase inter-rater reliability, decrease the risk of the 'observer effect' stressors, and may allow the learner to maintain full control of the activity. Limitations of this format include a lack of organic responses or engagement, the risk of scripted submissions, and the review and evaluation is time consuming.

Various technology options are available to meet the needs of pre-recorded learner sessions. Learners have the option of utilizing a webcam to create the video, and then upload it to a web-based class-management system, such as BlackBoard® or Canvas© (*Blackboard Learn*, 2021; *Canvas LMS*, 2021). How the files are uploaded may depend upon the class-management system used, as well as who will serve as the evaluator. Peer evaluations may require an upload to a 'Discussion Board' to ensure students can access the assigned peer-video. Some systems will allow for assigned peer-grading. Students can submit their assignments as normal for faculty evaluators to review. Previously reviewed and assigned assessment tools should be uploaded to the course page for the reviewers use. It is important that all assigned reviewers are trained on the tool and have practiced using it for evaluation prior to its implementation for student grading. Alternatively, independent video assessment tools, such as Bongo™, can serve as a medium for video recordings, feedback, and personalized analysis reports for learners (*Bongo*, 2021).

Interpersonal Encounters

Utilization of virtual platforms for the execution and assessment of interpersonal encounters provides both benefits and challenges. These platforms can provide real-time engagement with ‘standardized patients’ or ‘standardized providers’ from anywhere within the internet-capable world. This provides opportunities to learners who may have physical, travel, or cost barriers. By ensuring virtual interactions with an assigned individual, the learner will maintain the opportunity to engage in an organic experience, while the educator may synchronously provide a timely, meaningful assessment. Benefits of this format include the ability for evaluators and/or standardized individuals to ask follow-up questions, and it supports a realistic practice experience (Asan & Montague, 2014). Limitations include the risk of an intrusive standardized patient/practitioner, high cognitive workloads for evaluators, and aspects of interactions may be missed leading to risk of lower inter-rater reliability.

Interpersonal encounters can use the same platforms reviewed under pre-recorded videos, but the formatting will be different. As previously stated, all reviewers should be trained on the use of the assigned assessment tool prior to any student graded activities. The real-time streaming video may occur within a course management system, like BlackBoard® Collaborate Ultra, or through an external tool, such as Microsoft® Teams Meeting breakout rooms, or Bongo™ (*Bongo*, 2021; *Collaborate Ultra Experience Help*, 2021; *Microsoft® Teams*, 2021). The evaluator should have the assessment tool available either printed for upload later, or online via the course management system, and should complete the evaluation synchronously as the encounter occurs.

Pitfalls

Although transition to virtual assessment for soft skills provides many benefits, there are some overall limitations to consider. First, learners may be distracted by the ability to see themselves in a video format, which can affect their communication skills. There is a concern that learners may feel somewhat disconnected by a virtual setting, decreasing nerves and stressors that one might have in an in-person encounter that may arise again in such a setting. This may lead to a lack of personal connection with the intended patient and/or practitioner. Finally, it may be difficult for the evaluator to determine whether the learner is making appropriate eye contact or reading from prescribed notes simultaneously pulled up on the computer screen. These challenges warrant further consideration, yet do not necessarily require avoidance of virtual soft skills assessment.

SOLUTIONS AND RECOMMENDATIONS

The transition of skills-based competencies and EPAs to an online or virtual setting provides new opportunities to support learner abilities and needs. This format allows learners to engage in skills-based curriculum from virtually anywhere within the internet-capable world, avoiding barriers of location, transport, and finances. It provides opportunities to engage educators and evaluators who may otherwise be unable to attend an in-person training or grading activity. This may include extenders, such as clinical practitioners proficient in the respective activity, guest faculty, residents, or upperclassmen on clinical rotations. Finally, this format allows for the implementation of skills activities without limitations on physical space, which may support more efficient, effect, and timely execution of such activities.

As with all new educational opportunities, there are challenges to this format that should be considered. Clinical Skills course coordinators may have a larger workload during the first virtual offering due to the time required to evaluate virtual platform options, transition previous face-to-face training, assessments to virtual format, creating and coordinating schedules within the virtual platform, training evaluators and learners on the virtual platform, and preparation of technological 'hiccups' that may occur. Therefore, there may be a need for workload adjustments during this initial period or there may need to be some additional support personnel. Further, the transition to virtual learning may cause screen time fatigue, and decreased learner engagement, hence, this should be monitored throughout the course offering and encourage innovative ways to engage learners. Finally, the technology itself may provide some challenges that need to be evaluated prior to its first- time use. Technological challenges include the ability to provide guest access for external trainers or evaluators, internet connection disruptions, and troubleshooting needs within the virtual platform itself. All of these should be considered prior to adopting a new platform or software.

FUTURE RESEARCH DIRECTIONS

While some educators may remain hesitant with respect to the effectiveness of virtual learning for skills-based experiences, there is evidence to support its use (McCutcheon et al., 2015). Learners perform well with the transition of skills-based courses to virtual platforms, as compared to traditional face-to-face offerings (Kidd & Stamatakis, 2006). Virtual offerings were also well received by learners who report this format is more engaging, realistic, and supportive of critical thinking (Kidd & Stamatakis, 2006; Lim et al., 2020; Newsome et al., 2020). As new and addition information becomes available, it will be interesting to track the longitudinal learner performance, as well as educators' perceptions with respect to the benefits of virtual skills training and assessment.

CONCLUSION

While there are certainly advantages and disadvantages associated with the new remote methods of learning and assessment within the educational system, the strides being made within the development, establishment, and instituting of these novel, state- of- the- art platforms appear to contain key elements that clearly outweigh the challenges associated with their adoption. It is important that academic institutions equip their faculty with the necessary resources to help them integrate newly adopted digital technologies into the classroom and support their use in teaching and assessments as the evolution of technology continues to advance.

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KEY TERMS AND DEFINITIONS

Asynchronous: Learning that occurs either in different places/locations or at different times.

Hard Skills: Technical skills and abilities.

IPE: Interprofessional education is when two or more disciplines come together to learn with, from, and about each other to improve patient care.

OSCE: Objective structured clinical examination is a form of assessment involving multiple stations to test clinical skills performance and competence.

Remote Learning: The instructor and learners are not physically present in the traditional classroom setting and use electronic methods for teaching.

Soft Skills: Interpersonal skills and abilities.

Synchronous: Learning at the same time.

Chapter 14
Lessons Learned From the COVID-19 Pandemic and the Implications for Pharmaceutical Graduate Education and Research

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ABSTRACT

The COVID-19 pandemic has resulted in changes in the way we teach at all levels of education globally. This chapter specifically focusses on the impact of COVID-19 pandemic on MS and PhD programs in pharmaceutical sciences in schools/colleges of pharmacy in the United States. Potential expectations to bring the pandemic in control by rolling out the vaccine gives us hope, but there is an unmet need of medicines to treat patients affected by the disease. The impact of the pandemic on pharmaceutical sciences

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education has been on the pedagogy of teaching, research, mentoring, writing, and enrollment. This has also affected the progression of students in their programs as well as their stress levels and well-being. The role of administrators and accreditation agencies is critical in supporting graduate education by providing leadership and directions for the successful outcomes of these programs. Challenges and opportunities for these graduate programs are discussed in this chapter.

INTRODUCTION

Pharmacy schools are well-recognized for their contribution to the development of health care practice-ready graduates who will work in community, inpatient, and ambulatory patient care settings as licensed pharmacists. In addition, graduate (MS and PhD) programs in schools of pharmacy develop future researchers who will advance drug development and discovery, drug delivery, pharmacology, health outcomes, behavioral, translational, clinical, public health, and practice-based research. Although the discovery and development of new therapies requires contributions from both academia and industry, most mechanistic research related to the cause of a disease or mode of action of a drug occurs in academic settings, with many research laboratories located in schools of pharmacy (Flier, 2019). Schools of pharmacy are also vital contributors to the body of knowledge about disease control and management through social science research in areas like health outcomes, pharmacoeconomics and pharmacoepidemiology. The COVID-19 pandemic underscores the need for accelerated development of new treatments and illustrates the need for a continuous supply of trainees to maintain a strong scientific research workforce. Reliable information and scientific discovery are needed to inform policy, prioritize treatment strategies, distribute, and administer drugs and vaccines, and encourage behaviors that support public health. This chapter highlights the need for and value of graduate education and research in pharmacy schools in the context of the COVID-19 pandemic, together with perspectives on lessons learned from the pandemic, and applying the lessons to strengthen graduate education and research.

BACKGROUND

Most schools of pharmacy operate under a dual educational mission: both to train future pharmacists in professional Doctor of Pharmacy (PharmD) programs and to train scientists in graduate programs, which we define here as Master of Science (MS) and Doctor of Philosophy (PhD) programs. These graduate programs exist across a wide spectrum of scientific disciplines, including basic and applied natural sciences, clinical and translational sciences, and social and administrative sciences. Currently, self-reported descriptive information on graduate programs at sixty-four schools of pharmacy in the US is included in the PharmGrad Graduate Directory, a resource for students interested in pursuing pharmaceutical graduate education (American Association of Colleges of Pharmacy [AACP], 2021). While there may be some overlap between the clinically focused PharmD and the research-focused pharmaceutical sciences graduate training, PharmGrad information indicates key didactic and experiential differences between graduate and PharmD programs. Graduate programs typically include a research component, which is the foundation of the PhD but varies significantly in importance across MS programs. There are fully online MS programs, although most graduate programs in pharmacy schools still offer coursework and research training in-person. Generally, graduate program structures provide flexibility in course requirements and research training, to allow students to personalize learning and progress to degree. Similar to all educational programs worldwide, the COVID-19 pandemic caused significant disruption in delivery of didactic courses and in bench research in pharmacy schools (Higbea et al., 2021; Kawaguchi-Suzuki et al., 2020; Myers et al., 2020).

During the pandemic, classroom instruction transitioned to remote teaching and learning modalities, forcing instructors to reimagine classroom activities and assessment procedures. Due to distancing guidelines and rapid responses to the changing environment, all in-person activities ceased at most academic institutions for about 6-8 months. Many universities restricted research activities to those that were deemed essential, which placed a pause on progress for most PhD and many MS trainees. There were at least three consequences: 1) academic time loss for graduate students, 2) interruptions of research projects and loss of valuable supplies and research materials, and 3) delay in dissemination of research publications. Even as restrictions gradually lifted, distancing and capacity restraints required shifts in research logistics and schedules, often leading students to assume a more autonomous role. While most research projects were able to resume after 6-8 months of partially or completely restricted activity, some impacts were more severe, especially for studies that included enrollment of human subjects. Although working remotely provided students time and opportunity to synthesize data and focus on tasks like writing and project planning, it inhibited generation of new data and testing of hypotheses for bench research.

Confinement of graduate students in their homes affected their overall mental health and wellness due to isolation and lack of physical exercise (Sang et al., 2021; Zou et al., in press). Mental health of graduate students had already been identified as a concern before the pandemic (Evans et al., 2018; Flaherty, 2018; Wyatt & Oswalt, 2013) and was exacerbated by various pandemic restrictions. Graduate students who were accustomed to interacting with their peers and advisors in person on a daily basis suffered due to fewer opportunities for in-person human interaction (Zou et al., in press). However, the use of extensive internet-based communication provided some positive opportunities, allowing advisors more of an opportunity to guide students in literature searches, data analyses, and writing manuscripts, proposals, and grant applications.

Enrollment of students in graduate programs has also been impacted due to COVID-related travel and visa restrictions (Fischer, 2021), and the fear of contracting coronavirus (Knowles & Olatunji, 2021). International students account for roughly half of all students enrolled in graduate programs in pharmacy schools (AACP, 2019), so these roadblocks affected both students and programs (Dennis, 2020). Furthermore, many summer internships and job offers were rescinded due to visa restrictions, workforce reduction, and shutdowns. These challenges threaten the ability of graduate programs to maintain overall applicant quality, provide opportunities for talented international students, and ensure diversity. As a result, there is a possible effect on the future drug development workforce.

Graduate programs are supported through state funding, public and private grant support, and professional program tuition revenue. These funding sources support research projects and graduate students by providing stipends and covering tuition and healthcare insurance costs. Existing financial pressures and challenges in graduate programs due to declining state funding, increased competition for grant funding, and declining enrollment in professional pharmacy programs (Brown, 2020) were exacerbated by the COVID-19 pandemic. Both state and institutional budgets were strained due to shifting priorities to respond to pandemic-related expenses. At the institutional level, funds were often prioritized to upgrade technology to support the shift to online teaching, support for pandemic-related expenses including cleaning and personal protective equipment, and provision of additional personnel and infrastructure-related expenses. Simultaneously, most institutions experienced losses in revenue due to campus shutdowns that impacted university housing as well as deferred admissions. The pandemic also delayed graduation of students thereby requiring extension of graduate assistantships, while faculty were also facing a delay in grant application submissions due to research shutdowns. Lab supplies, including personal protective equipment, that were donated to medical centers early in the pandemic needed to be replaced, along with research materials that were lost to lab shutdowns. For some MS programs, there was lost tuition revenue, particularly from international students who could not or chose not to enroll for the 2020-2021 academic year. A lack of adequate revenue at academic institutions and increased financial burdens at institutions could put the viability of some graduate programs in question. This could result in long-term loss for institutions, as graduate programs can enhance the research recognition and reputation of an institution.

Evolution of Graduate Education in Schools of Pharmacy

There has been rapid growth in the number of pharmacy schools in the US over the past 20 years, from 80 in 2000 to 143 in 2020 (Brown, 2020.) Most new pharmacy schools are housed under private universities and emphasize health professional training and the PharmD degree. However, data from the American Association of Colleges of Pharmacy (AACP) on program enrollment and degrees granted by graduate programs in pharmacy schools does show significant growth in graduate education over that time as well. (Figure 1) This data also indicates that the emphasis on MS and PhD programs has differed in public versus private pharmacy schools (AACP, 2019). (Figure 1) Private schools have consistently conferred more MS than PhD degrees over the past 20 years, while it is only in the past five years or so that the same has been true of pharmacy schools at public institutions. That being said, there has been significant focus on MS programs in both public and private schools, where the numbers of degrees conferred have increased 170% and 245%, respectively, in the past 20 years (AACP, 2019). Over the same time period, the number of PhD degrees conferred by public schools has increased at a steady pace, with about a 50% increase, and PhD degrees conferred by private schools have increased approximately 70%.

Graduate program funding is a persistent source of stress, and faculty are also under pressure as they juggle teaching responsibilities in professional programs with their efforts in graduate education and research. The current pandemic has aggravated this stress on faculty as they have spent considerable time reorganizing courses to meet the immediate needs of educational programs (Turk, 2020). The pandemic had varied effect on public and private schools due to differing funding source models between these two types of institutions, but effects were serious for both types of institution. Additional data collection and analysis is required to delineate the different types of graduate programs and the funding models in schools of pharmacy.

International/nonimmigrant graduate students are one of the largest constituents in graduate programs in biological and biomedical sciences. The National Science Foundation (NSF) reports that 22% of PhD students in biological/agricultural sciences are international (Ghaffarzadegan et al., 2015). International students account for a significant share of both MS and PhD students in pharmacy graduate programs as well. (Figure 2) The increase in international MS graduates shown in Figure 2 likely help fulfil the required workforce in various pharmaceutical and biomedical industries in the US and elsewhere. However, NSF data indicates that the share of international students in biological/agricultural sciences was static or decreasing even before the pandemic, with NSF data indicating a decrease from 29.52% in 2008 to 24.53% in 2018 (National Science Foundation, 2018). Competition from established non-US schools and ongoing development of research capacity in countries including China may have contributed to this, evidenced by decreasing numbers of applications received from these countries. As graduate programs typically take two to five years to complete, both the full effect to the work force and ability to recover from the pandemic may not be realized for several years. Therefore, unless there is a substantial increase in enrollment among US citizens in graduate programs, the academy and the pharmaceutical industry may experience the aftermath of the current decrease in supply of pharmaceutical scientists for many years to come as fewer international trainees will be available.

AACP has in recent years worked to support the re-examination and development of graduate education programs across all academic sectors in colleges of pharmacy, including an evaluation of the current training landscape. The AACP Research and Graduate Affairs Committee has repeatedly highlighted the importance of 'power skills,' including innovation, entrepreneurship, project management, self-awareness, and self-promotion, as part of a competency framework for graduate education to prepare students for successful careers (Poloyac et al., 2017). Pharmaceutical graduate education, therefore, should include a strong professional development component that encourages creativity and entrepreneurship, project management, a highly developed framework of ethics, skills in written and verbal communication, teamwork, and an understanding of how specific research areas interface with other elements across the spectrum of drug development. The next section will highlight the importance of this graduate-level training and explore pandemic-related impacts that must be managed and learned from as graduate education in the pharmaceutical sciences navigates the post-pandemic era.

Figure 1. Graduate degrees conferred by public and private pharmacy schools in 1998-2018

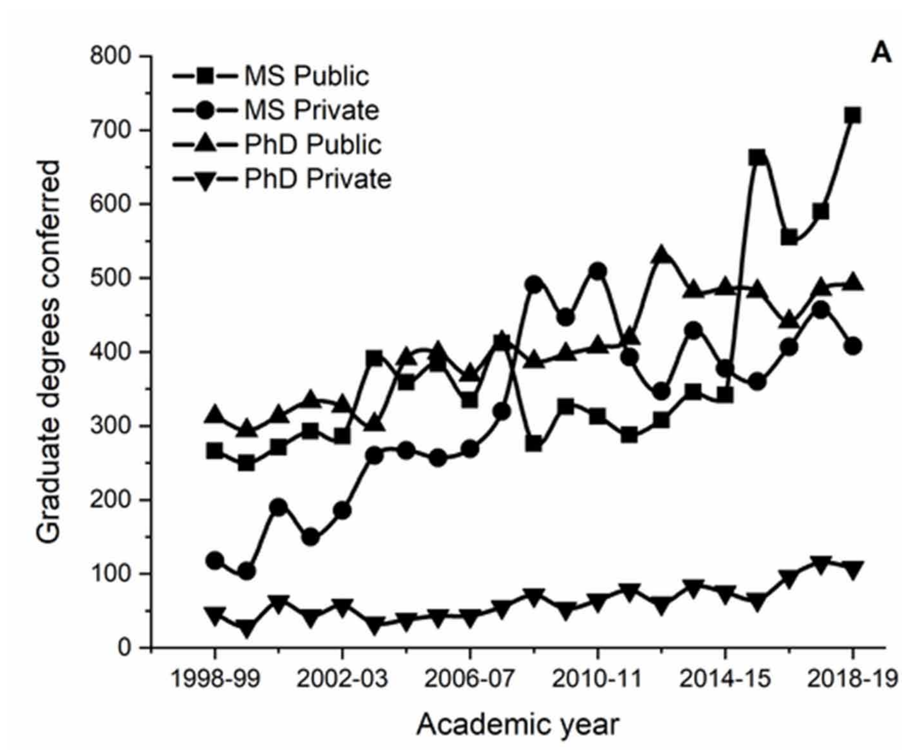
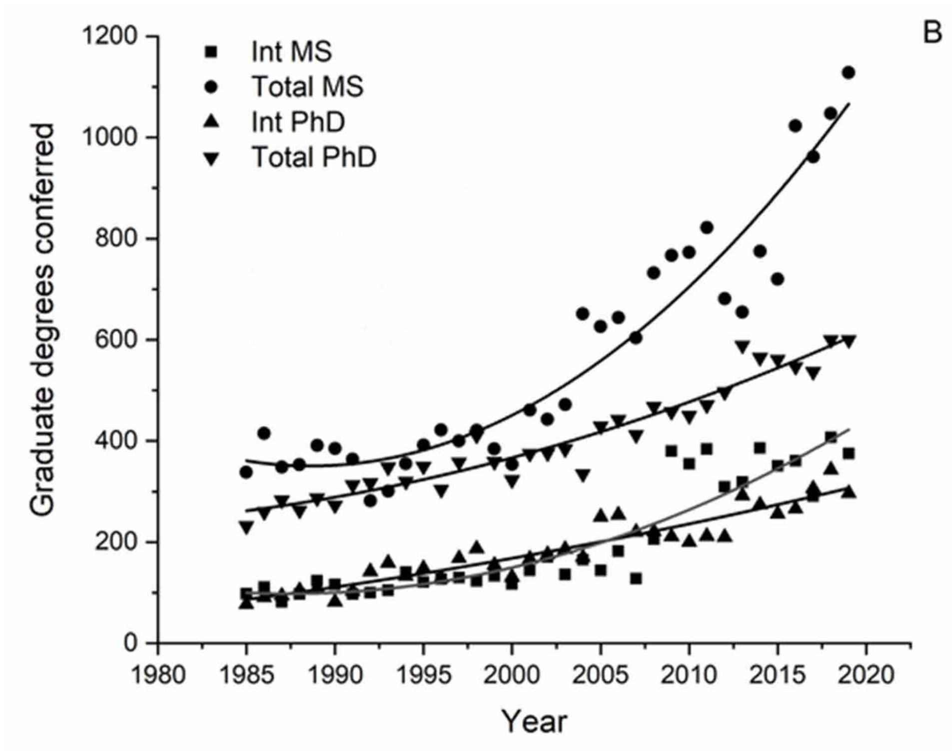


Figure 2. Number of total MS and PhD degrees conferred by pharmacy schools in 2020, along with MS and PhD degrees conferred to international students (Int MS and Int PhD)

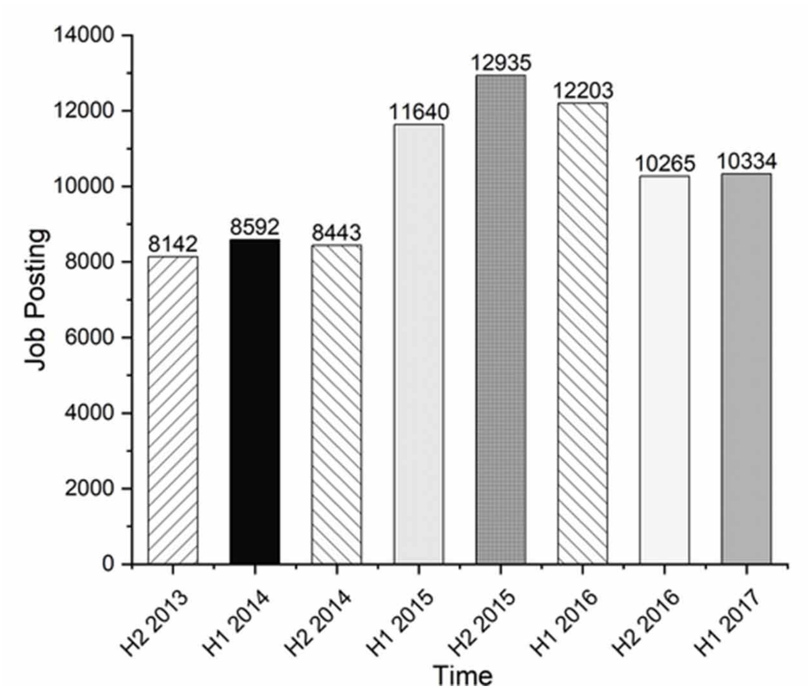


IMPORTANCE OF PHARMACEUTICAL GRADUATE EDUCATION

Graduate level education is directly correlated to the advancement of knowledge, and economic and social prosperity of the country (Council of Graduate Schools, 2008). According to the US Bureau of Labor statistics, employment based on the entry-level education of doctoral (PhD and professional) and master's degrees is expected to grow at the rate of 9% and 13.7%, respectively, from 2018 – 2028. By contrast, the job growth for bachelor's level education recipients is expected to grow at the rate of 7.7% during the same period. (Wendler et al., 2010). Figure 3 shows historical demand for MS level graduates in pharmaceutical sciences based on national job posting data from the second half of 2013 until the first half of 2017. The data shows a net increase of 27% in MS level job postings during this time (EAB Database, 2021). This rising demand helps explain the growth in MS enrollment in pharmacy schools over the past two decades.

Graduate programs and graduate student research engagement provide a platform for the scholarly support of faculty members as well as national recognition of the college/university, while simultaneously preparing future researchers and faculty. Graduate training provides students with advanced knowledge and skills, and further develops critical thinking skills necessary to produce innovators. Pursuing research and nurturing future research personnel through graduate education is an important component of the academic mission and enduring part of university life. Research is critical, not only in the pharmaceutical sciences, but also for the advancement of pharmacy practice. Researchers in pharmacy and other

Figure 3. MS pharmaceutical sciences job postings between second half of 2013 and first half of 2017



health professions schools can advance translational research and facilitate the transfer of outcomes of contemporary research into the clinical setting.

Developing solutions to the greatest challenges facing our nation and the world today will depend heavily on a workforce which is highly skilled and trained at the appropriate level to develop competencies focused on creativity and innovation. In a knowledge economy based on creating and evaluating new information, those with graduate degrees will be critical in bringing entrepreneurship and development of new models to public sectors and healthcare (Bailey, 2001). An accepted economic belief posits that economic growth is based not on producing things, but rather on the development of ideas that lead to technological progress (Broughel & Thierer, 2019). Clearly, this can be applied to healthcare, where our continued progress in improving the health of individuals and communities depends on our collective ability to innovate across the drug development and distribution ecosystem. Such innovation is not limited to developing new drugs. Drug repurposing for the treatment of COVID-19 is an example of the impact an entrepreneurial mindset focused on problem-solving can have, as treatments were made available early in the pandemic at a fraction of the time and cost to develop a new drug. The National Center for Advancing Translational Sciences (NCATS) has a major focus on drug repurposing research through a public-private partnership even before the pandemic but has received increased attention since the pandemic (National Institutes of Health, 2020). Repurposing off-patent drugs is less attractive to the pharmaceutical industry. On the other hand, drug repurposing represents a niche opportunity for pharmaceutical science graduate research programs to reposition existing drugs for new indications or develop improved therapy through structural modification, target new disease pathways, and develop new delivery systems. This provides unique research and entrepreneurship training opportunities as pharmaceutical sciences graduate programs evolve during the post-pandemic era.

Innovation in the social and administrative sciences will also play an important role managing the recovery from COVID-19. Surveillance and use of large secondary data sources facilitate identification of transmission patterns, drug safety monitoring, and measurement of treatment effectiveness. Drug safety and comparative effectiveness studies can aid in ensuring safe and effective treatments for COVID-19, which will determine the short- and long-term economic, clinical, and humanistic health outcomes in a large portion of the global population. Cost-effectiveness studies will also be needed, given the fact that emerging treatments are expensive and in short supply. Graduate training in colleges of pharmacy in the areas of pharmacoepidemiology and pharmacoeconomics is critical to address these important questions. Research in health disparities to address the vastly different disease burden and outcomes seen across demographic groups in the US (Centers for Disease Control and Prevention, 2016) is another crucial opportunity for pharmacy schools to innovate and integrate research into their educational mission.

Graduate programs in pharmacy schools are well-positioned to provide clinically informed education and research training. MS programs can capitalize on the clinical and practice expertise of faculty in planning and delivering curricula grounded in clinical practice and needs. This is valuable context even for graduates who will work in the pharmaceutical rather than health care sector. No matter where one's research focuses across the spectrum of pharmaceutical sciences, a general understanding of clinical problems, and patient-related pathologies and outcomes enhance the ability of scientists to function as part of collaborative teams that develop novel therapeutics. In settings of both industry and academia, scientists in biomedical fields must be able to communicate with one another and appreciate related scientific fields including those that relate to patient care and population outcomes. In many programs, PharmD students pursue MS degrees alongside their professional training in dual degree programs, further enhancing the learning environment with their clinical insight and expertise. For PhD programs, clinical faculty can act as mentors for clinical and translational research projects, and consultation and collaboration with practice faculty can enhance the clinical relevance of biomedical and health outcomes research.

SOLUTIONS AND RECOMMENDATIONS

The COVID-19 pandemic forced most graduate programs to shift course offerings and research activities to remote modalities. Faculty converted their face-to-face classes to online instruction in a matter of days to weeks, a process which normally takes months to years. While some schools of pharmacy include faculty and staff with expertise and experience in remote learning techniques, others had to make the immediate switch to online learning with limited guidance. In the transition, faculty have faced issues with the utilization of technologies, the ability to maintain engagement of students in remote settings, establishing a presence during live and asynchronous activities, and creating seamless integration of remote operations and assessments. The pandemic has accelerated remote coursework allowing expansion of graduate education offerings and created more channels of communication compared to the pre-pandemic era. Since the start of the pandemic, significant time and resources have been dedicated to the improvement of professional and graduate faculty skills to ensure that their ability to teach in remote or hybrid environments is maximized. Colleagues at the University of Arizona, College of Pharmacy report hiring an expert in online teaching models.

Although the shift to online instruction was prompted by the COVID-19 pandemic, this trend is expected to continue. Online and hybrid delivery of courses can provide solutions to many of the pragmatic or logistical issues that arise when planning a graduate curriculum. Scheduling issues can be extremely problematic when attempting to deliver a course that graduate students in multiple programs must take simultaneously. Often courses include students in both masters and dual degree programs, which further complicates scheduling issues. Asynchronous, online, or hybrid formats can ease these scheduling restrictions, although limitations on online learning for visa holders must be considered, as learners on student visas are limited to one online course per semester.

Another issue commonly faced in graduate education is that of personalized education. In most research-based graduate programs, specific topics within traditional courses that transect the whole semester may be more or less relevant to a student. By offering asynchronous courses arranged in a modular format, more efficiency can be achieved in tailoring training to students. Instruction and training on specific topics via an a la carte asynchronous model, with faculty providing live support when needed, is a logical approach that can be explored for enhancing the efficiency of program completion for students and faculty alike. The pandemic is likely to accelerate the consideration and development of such course offerings that could improve the ability of programs to provide efficient, personalized learning to their graduate students.

Online instruction can also expand the reach of graduate programs and help reduce the duration of the program by enabling students to complete most of the course work before beginning their on-campus learning experiences. Universities are increasingly using open online delivery platforms to offer a la carte courses and micro-credentialing programs (Fain, 2015). These platforms provide new opportunities for pharmacy schools to develop and expand flexible graduate program offerings, such as stackable graduate certificates, non-thesis MS programs focused on skills or knowledge development rather than research training, and graduate certificates for PharmD students and working professionals. However, the suitability of fully online graduate training for research-based programs will depend on the discipline and research focus. Such training may be difficult to provide for wet lab bench research but could be successful for data-based or other dry lab research topics. In all cases, consultation with appropriate accrediting bodies will be necessary as new modalities are developed and rolled out.

Pharmaceutical Sciences / Translational Research

Graduate programs play a critical role in developing strong research programs, supporting faculty scholarship, and contributing to national recognition of the institution. As with teaching and learning, faculty members, graduate students, and post-doctoral fellows were forced to make abrupt changes to their research plans during the pandemic. Global research progress in general (Broughel & Thierer, 2019) has been severely impacted by the COVID-19 pandemic. While operating remotely presents challenges to progress in laboratory-based activities, effective mentorship can be achieved remotely (Abdelhamid et al., 2021; Bal et al., 2020). This requires planning and careful attention to the development of activities that can be pursued while being away from the primary research environment. In many cases, students can be consumed in 'experimental mode' and in performing experiment after experiment, neglecting other activities that are important to efficient progress, including thinking, reading, writing, reflecting, and planning. Although experiments were delayed, remote mentorship may have resulted in more guidance by advisors that may, ultimately, have improved the ability of the trainee to progress towards the completion of their research project.

Some schools also utilized remote learning to support the development of power skills for graduate students through online workshops, lab meetings, presentations, and discussions. For example, one author's institution utilized a student-led weekly faculty virtual interview series as a professional development opportunity for PhD students in pharmaceutical sciences. Online communication platforms also provide opportunities for collaboration among various institutions. For example, in one author's institution, a Zoom-based pharmaceutics journal club was initiated with participants from US, South Africa, Germany and Russia (Zoom Video Communications® (San Jose, CA)).

As translational research encompasses experiments and protocols that span from bench to bedside, research was affected by challenges ranging from laboratory shutdowns to rerouting of clinical resources in response to COVID-19. Research laboratories were asked to donate personal protective equipment (PPE) to hospitals, making supplies for both animal and clinical research in short supply. With phased reopening of campuses, individual units had to meticulously plan for safe resumption of research activity. This included prioritizing essential research functions and coordination with individual research labs to optimize safety through physical distancing. In addition, many potential research participants are hesitant to engage in clinical research activities, making recruitment difficult. Researchers were able to shift to online versions of some of these activities and communication with participants via electronic means; however, this becomes difficult with rural or disadvantaged populations who may not have access to the necessary technology (Almarzooq et al., 2020). While careful attention should be paid to preserving diversity in recruitment of research participants, online recruitment, enrollment, and participation has become a viable solution that will likely continue post-pandemic.

Graduate Student Recruitment

Fifty-six percent of graduate students in pharmaceutical sciences are of international origin (Redden, 2017). As discussed above, international students comprise approximately half of graduate students in pharmacy schools. Therefore, the pandemic posed significant challenges to graduate student recruitment. Universities have responded in different ways to these challenges, with some allowing more flexibility than others. Several schools offered online courses to international students as a way to circumvent travel and visa restrictions (Edmonds, 2020). However, in many cases students cannot be offered assistantships if participating remotely and are, therefore, not eligible to receive a tuition waiver, causing a financial burden for them. Some schools made exceptions by providing a tuition waiver for international students participating remotely. Some schools offered delayed admissions, allowing international students to join programs mid-year in spring or the next fall depending on the level of comfort of the student. Leaders throughout the academy are working together to support these students and advocate for programs to be better prepared to minimize the impact on international students.

The move towards a more holistic approach to admissions, which has been gaining momentum of late, is likely to accelerate as a result of the pandemic (Kent & McCarthy, 2016). These approaches consider additional factors about students and the value they bring to programs beyond standardized test scores or grades. About fifty percent of graduate programs did not require Graduate Record Examination (GRE) scores prior to the pandemic (Langin, 2019), a trend also seen in pharmaceutical graduate education. Critics of the use of these tests in admissions point to a lack of evidence that they predict success in graduate programs, while being perceived as a barrier to participation in graduate education by underrepresented students (Millar, 2020). There is concern that some proposed approaches to holistic admissions, such as greater emphasis on research experience or completion of advanced courses, may lead to even greater disadvantage of students from resource-poor environments, including students from underrepresented populations (Augusto, 2020). Graduate programs should carefully consider and develop rubrics that equitably account for the value provided by different experiences, such as home and work responsibilities beyond traditional academic pursuits. Admissions decisions should consider multiple predictors of success, and care should be taken that interpretation of metrics is conducted in a valid manner. For example, looking at the verbal and quantitative scores separately, rather than summing them, enables better appreciation of a candidate's distinct strengths. One important consideration is that programs should avoid the use of 'cut points' to screen out applicants, which can have severe implications for diversity and equity while not improving the quality of the candidate pool. Because the pandemic accelerated the adoption of GRE elimination in many programs, it will be important to consider these aspects of admissions thoroughly moving forward.

The recruitment of domestic students has been challenging due to mounting student debt and the length of time for degree completion, although recruitment of local students during a pandemic could be advantageous as travel is minimized and students are closer to support systems. In addition, there is a general countercyclical increase in graduate school enrollment during a recession to upskill or reskill for enhancing job prospects. Prospective graduate students and adult learners look for a few focused features of the program in today's highly competitive market, including, 1) how quickly the program can be completed, 2) does the program offer options that fit with students' lifestyles, and 3) does the program offer value that students feel they will not get elsewhere (Edmonds, 2020). In this regard, the master's program and stackable graduate certificates offer growth opportunities for the recruitment of domestic students. Due to the interdisciplinary nature of pharmacy graduate education training, pharmacy schools can also focus their efforts on recruiting students from other disciplines such as biology and chemistry.

Simultaneously, graduate program leadership from several programs have reported that the shift to either a completely online or hybrid recruitment and interview process expanded the reach of programs to consider applicants more thoroughly from all parts of the world (Lamb, 2021). Hybrid models that included remote interviewing for the 2021 recruitment cycle allowed for a broadened scope in many instances. Additionally, some programs are considering changes in the interview format to include a round of interviews that are restricted to a remote format to allow for interaction with a larger number of candidates on a level playing field. This may also allow programs to increase the number of under-represented minority students admitted, enhancing diversity at schools that have historically struggled in this area. Besides, the convenience, virtual recruitment and interviews can lead to reduced travel and cost savings to the institution. The impact of these recruitment changes on the incoming student cohort is currently unknown. Additionally, the impact of these changes in interview formats cannot be evaluated from 2021 independently of the simultaneous effects of the pandemic.

Support of Graduate Student Wellbeing

Improving the support of wellbeing of students (both professional and graduate), staff, and faculty at colleges of pharmacy has been a priority within academic pharmacy in recent years (Imeri et al., 2021; Miller et al., 2018). The COVID-19 pandemic exacerbated many mental health struggles within the graduate student population and forced programs to be creative in developing novel ways to support students during this time of isolation and disconnect. A survey of graduate and professional students at one school of pharmacy found that 61% percent of graduate students agreed that they felt more down or depressed during the period of remote learning due to the pandemic, compared to 42% of professional students (Zou et al., in press). Some graduate students also reported social isolation and anxiety as their families lived in other states or countries. They did not have access to their research labs, but they had more time to finish course assignments and engage in non-work hobbies. The study findings suggested that professional and graduate students were both positively and negatively affected by the transition to remote learning, but graduate students reported more difficulty adapting.

Graduate Student Personal and Professional Development

Programs can utilize technology to provide social connection and events for student groups, including online social hours, online games, and other activities. Additionally, programs found ways to address wellness issues of specific concern. Prior to the pandemic, the Department of Health Outcomes Research and Policy at Auburn University Harrison School of Pharmacy began hosting a personal and professional development workshop series known as Mind-FULL Mondays to provide graduate students with a relaxed environment to participate in fellowship and to learn about various topics in personal and professional development on a monthly basis. In-person meetings occurred once per month and were led by the Graduate Program Officer (GPO). Student attendance was voluntary and did not require any pre-meeting preparation. Examples of discussion topics included imposter syndrome, fear of public speaking, time management, handling difficult emotions, etc. The typical structure of the meeting included students taking turns reciting from a handout or reading, then open discussion among participants to share personal experiences and to ask questions. The GPO acted as a facilitator of these meetings by stimulating discussion and answering questions when appropriate. When the University moved to an alternate operations model in March 2020, these meetings transitioned to virtual meetings via Zoom. The structure also changed to accommodate the need to keep it very informal and less intimidating in a time of elevated levels of student stress. Instead of having students take turns reading material out loud, the GPO introduced a topic or resource briefly, opened up the forum for questions and answers, and then left the Zoom meeting so that students could speak freely and socialize with one another without any faculty present. This process was intended to accomplish three goals: (1) to continue providing resources and training for personal and professional development; (2) allow students to ask questions of the GPO in an uncertain time when many questions were on their minds; and (3) to create a platform and accessible opportunities for student socialization in a time when remote learning and remote work limited their social interactions significantly. This new format is more convenient for students to access and could continue to be utilized going forward to support graduate student well-being. Further research is needed to measure the impact of such programs.

Mentorship

High quality mentorship and advisement of graduate students are critical factors to the success of students as they mature into impactful scientists and transition into their careers. Pharmaceutical sciences graduate programs can benefit from enhancement and continuous improvement of mentorship skills of their faculty. Several topics that have been recently incorporated into mentorship include a shift in focus to address broad sets of core competencies among graduate students, (Poloyac et al., 2017) an emphasis on holistic, student-centric training philosophies, (Feola, 2019) and the expanded support of graduate student wellbeing.

Several aspects of mentorship were critical during the pandemic, and mechanisms were incorporated to ensure optimal continuation of student training and progress. Mentoring/mentee contracts can be modified to be used to create advisor/student agreements to define and strengthen mentorship relationships and understanding between students and advisors. This tool can be especially useful in remote environments to provide clarity of expectations for both students and faculty. These agreements between individual students and faculty advisors can be tailored to individual graduate programs and faculty research programs to provide transparency and explicitly present expectations to avoid misunderstandings of required activities. A variety of topics can be included such as student conduct, program and research program attendance, teaching, and funding. Programs can create basic templates that reflect topics of interest to faculty in their programs. Faculty can then modify agreements to incorporate individual research laboratory expectations setting up a structure for consistency, which enhances fairness across students. Agreements are adjusted, signed, and dated both by advisors and students to provide transparency and confirmation of understanding. Copies of the agreement should be provided to both the advisor and student and can be filed with the graduate program. These agreements are useful when enacted at the beginning of the advisor relationship as they can identify potential problems and avoid issues. Mentoring training can be incorporated into individual graduate programs or may be available through central resources such as the university's graduate school or other colleges or institutes that specialize in mentoring training and evaluation.

The inclusion of online streaming into main functions of the program and department has also created increased opportunities with alumni to expand their roles as mentors. As most meetings and classes now have an online component, it not only facilitates added mentoring opportunities with alumni, but also increases student interactions when alumni are engaged as outside speakers, and through attendance in classes and seminars. Zoom alumni events with breakout rooms can be scheduled periodically throughout the year to facilitate student and alumni connections which can lead to internship and job opportunities. Alumni events can include formal components such as a presentation schedule with free discussion time or as social events with incorporation of meet and greet activities. Table 1 lists solutions and recommendations for various challenges in graduate education.

FUTURE RESEARCH DIRECTIONS

Looking Forward – What is the New Normal?

At the time of writing this article, we have already lost over half a million of Americans, surpassing the combined death toll of WWII, and the Korean and Vietnam wars (Hollingsworth & Weber, 2021). The SARS-CoV-2 vaccine rollout has gained steam with the new US administration, aided by the Emergency Use Authorizations granted by the FDA to three vaccine candidates. It is predicted that the global economic outlook might attain parallel status to the pre-pandemic projections by mid-2021 (Boone, 2021). However, the emergence of SARS-CoV-2 variants and continued efficacy of vaccines and antibodies will determine when and how we will achieve normalcy. On the other hand, we have learned how to adjust teaching environments in a fast-changing environment in ways that could not be imagined in our pre-pandemic daily lives - activities and methods that will undoubtedly shape the 'new normal' in the higher education industry going forward.

Table 1. Solutions and recommendations for graduate education and research

Graduate Education	Solutions/Recommendations
Teaching and Learning	● Flexible program offerings- Graduate certificates and stackable degree options ● Non-Thesis Master's ● Live and asynchronous online/hybrid courses for students in multiple programs, dual degree students, adult learners and working professionals ● A la carte and customized modular offerings to suit students in different programs ● Open education resources to augment student learning
Research	● Using virtual platforms for research collaborations ● Virtual research seminars provide increased access to external speakers, reduced travel and cost savings ● Virtual dissertation defense to reach broader audience ● Virtual multi-institutional journal clubs ● Virtual events for developing power skills
Recruitment	● Virtual recruitment events to reach a larger applicant pool including international and underrepresented students ● GRE waivers to reduce the barrier for admission ● Virtual interviews to provide flexibility and reduce travel as well as cost
Student wellbeing	● Virtual wellness events ● Virtual counselling sessions ● Wellness webinars ● Virtual social and networking events
Mentorship	● Virtual student-alumni networking events ● Virtual alumni engagement events ● Virtual network events of professional organizations- e.g., young scientist mentoring program offered by professional organizations

Survival of Established Institutions

Universities faced major challenges in 2020 as tuition revenue dropped significantly. A number of students took a gap year or a different career path due to their family's financial situation. Although endowment funds may have performed well in the surging stock market at the end of 2020, university administrators are hesitant to offer extensive scholarships in anticipation of loss of full tuition paying students. As an example of the insurmountable stress faced by some educational institutions, it is to be noted that MacMurray College survived the Civil War, the Great Depression and two world wars, but not the coronavirus pandemic due to declining enrollment and financial crisis (Korn et al, 2020). The University of Evansville, Indiana, will no longer offer art history, philosophy, and religion as majors to incoming students, and will merge the School of Business Administration with the College of Engineering and Computer Science (Pietruszkiewicz, 2021). Marquette University in Milwaukee is planning to terminate 225 faculty and staff positions this year (Burke, 2020). In addition, there are a few mergers, and over one hundred institutions are on financial 'D' grade according to Forbes (Schifrin & Tucker, 2021). Therefore, universities will need to carefully judge the viability of each existing or new program based on needs analyses, job prospects, level of local or national competition (especially for online programs), and the general interest of the clientele and demographics in their localities. Although research-based graduate programs are sometimes considered a revenue loss proposition, counterintuitively at this time of crisis and competition they could come to the rescue by helping improve brand reputation, and student recruitment and enrollment.

Higher Education Student Recruitment

The price and value of a specific higher education degree will be of paramount importance to aspiring students. The value of transferable knowledge and skills will be more attractive to the post-pandemic post-baccalaureate student populations. AACP recommended in 2017 that all graduate programs in pharmaceutical sciences develop a core set of competencies that provides a framework of training to prepare graduates for their careers (Poloyac et al., 2017). These competencies focus on five separate skill domains and include programmatic intentionality in the training of foundational skills including innovation, communication, and leadership. Many programs have adopted these recommendations, which could also be effectively applied to graduate programs across the health science disciplines. For pharmaceutical sciences, the academy has addressed this issue through the recommendation of core competencies that each program should establish. MS and PhD programs in pharmaceutical sciences need to review their course offerings to meet the needs of students, and prioritize their application towards job requirements, including the development of soft skills and business/entrepreneurial acumen. As discussed above, holistic admissions approaches may help to identify talented candidates who may have been lost using traditional metrics. Funding for graduate education remains scarce, which may lead to a reduction in the number of graduate students. However, jobs for graduate students in pharmaceutical sciences may increase in the pharmaceutical industry in the near and long-term future, potentially leading to a gap between supply and demand.

Nature of Graduate Programs – Delivery and Assessment

The faculty, administrators, as well as the students are now all familiar with the online delivery of courses. In the future, graduate students might prefer hybrid offerings for MS or PhD programs that would fit their schedule and lead to less onerous travel requirements. This format might be more suited to adult learners and working professionals because of convenience. This could be very attractive to international students who might be able to complete all didactic requirements while living in their own countries. To establish online programs, smaller universities will need to be highly competitive with the big players in this marketplace to survive and thrive. It might be a good idea for universities to form various niche programmatic consortia or collaborations to develop online or hybrid programs. This has been done by universities working with massive open online courses (MOOCs) to offer a la carte courses/certificates and stackable degrees/certificates.

Faculty Development and Work/Life Balance

Since March 2020 faculty, research personnel, and graduate students have all been either isolated or limited to small work bubbles (Flaherty, 2020). With vaccinations becoming increasingly accessible, some relaxations have begun while still maintaining strict guidelines for in-person interactions. At the beginning of the pandemic, some academics opined that isolation could bring more productivity as we could complete our pending manuscripts (Müller et al., 2020). Countries with a stable scientific infrastructure maintained non-COVID-19 publication productivity nearly at the pre-year level and at the same time use their resilience to produce COVID-19 publications at high rates (Müller et al, 2020). The concept may have worked for a few months, but the lack of social interaction ultimately did not contribute positively towards productivity. Moreover, faculty members with young children at home having to supervise their K-12 school curriculum experienced further setbacks, and additionally gender disparities were observed, as self-reported manuscript submissions by women decreased whereas those by men did not change (Krukowski et al, 2021). There are at least three distinct issues that have cropped up with online course offerings and social isolation, as described below.

In most schools, the online technologies for course delivery, exams and exam proctoring were new to faculty and they were thrown into this unfamiliar platform without much-needed training. Therefore, faculty needed to devote enormous amounts of time into the development of their online course materials and exams. One of the major changes was the extent of online interaction with students. The standard 'office-hour' model may have had limited success in the online environment. Solutions would include appropriate scheduling for office hours and better communication with students. With online course offerings and asynchronous lectures, students expect multiple online Zoom help sessions outside of formal 'classroom' interactions. There is also the expectation of instant email replies from faculty, and many more students likely sought one-on-one help from faculty, as they felt lost without their normal environment and boundaries. These factors have taken up extra, unanticipated time for faculty, leaving them stressed and strapped for time to pursue their research and personal development. In the future, we must give a clear understanding to students that online does not mean faculty members working 24/7. Moreover, when students take their exams at home, no online test platform has been proven to be 100% foolproof against online exam cheating, despite remote proctoring.

Faculty members, graduate students, and research personnel who are heavily involved in bench-level lab work, fieldwork, clinical studies, etc., were forced to be completely detached from their workplace, and there is no virtual/online alternative for many of these activities. Many suffered from compromised interaction with colleagues. Water cooler and hallway conversations are important for both mental health and productivity, as many fresh ideas are generated during these interactions (Lee, 2020).

Faculty development is the third area that suffered immensely during the pandemic. Fortunately, several institutions have extended their tenure clocks for six months, or a full year (Htun, 2020). Almost all conferences and meetings have gone virtual, which may have served the purpose of presenting a poster or podium talk, but networking, which is crucial at meetings, was severely hampered. This has affected faculty members looking for new research collaborations or senior graduate students who are looking for jobs. Several virtual networking sites have been proposed, and we will have to get used to such virtual interaction platforms, but only the future will tell whether they are effective. Finally, graduate programs in many schools have shrunk or remain suspended indefinitely, which has directly affected the research productivity of faculty members.

CONCLUSION

As graduate programs play a critical role in training the next generation of pharmaceutical scientists, how we maintain or enhance our current level of training is of critical importance. Given that graduate and research programs in pharmacy schools span the entire spectrum from drug discovery and development to disease management, their role in developing innovative treatment approaches to aid in the pandemic and future health emergencies is of great significance. There is no doubt this pandemic has created unprecedented challenges for graduate and research programs in pharmacy schools. However, in creating solutions, alternative teaching and research models have been produced. The extensive use of virtual platforms to increase the flexibility in communication may actually result in improvements in some areas of advisor-student mentoring, and may lead to unique hybrid models when the pandemic has passed. Thus, the lessons learned during a time of pandemic can be applied going forward to help schools restructure and transform graduate education and research. To this end, it is critical that our training programs support and develop creative thinking, problem-solving, and innovation skills in graduates to ensure their ability to continue to drive novel solutions to the most critical problems in healthcare and beyond. It is important to balance training in application-based research that can influence local, national, and global communities with an equal emphasis on fundamental research. This can be the impetus for future discoveries and innovations. The importance of the contribution of graduates of MS and PhD programs in pharmacy schools in all aspects of translational, preclinical, and clinical studies is remarkable. Finally, it is important to emphasize the importance of MS and PhD programs in pharmacy schools to bring awareness to the general public, potential applicants, funding agencies, accreditation bodies and policy makers.

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KEY TERMS AND DEFINITIONS

Assistantship: Employment opportunity for graduate students that typically supplies a monthly stipend and benefits such as tuition.

Asynchronous Instruction: Courses that are not taught in real time and can be accessed at different times and locations.

Bench-Level Lab Work: Scientific research carried out in a laboratory. Bench implicates to work bench in a laboratory where equipment can be placed and operated as well as experimental procedures are conducted.

Contemporary Research: Professional research studies that provide evidence of the impact of instructional practice and leadership.

Drug Repurposing: Identifying new uses for existing/available drug therapies.

Holistic Admissions: Review of applications that considers multiple ways an applicant can demonstrate suitability for graduate school, rather than relying only on a single standard measure of success, such as standardized test scores or grade point average.

Hybrid Approach: Combination of in-person instruction/programs and synchronous/asynchronous instruction/programs.

Micro-Credentialing Program: Flexible ala carte courses for skill development or upgrading skills related in a specific area. These programs are rapid and supplement traditional programs.

MOOCs: Massive open online courses.

Pharmaceutical Sciences: Field that encompasses a broad range of multiple disciplines in the support of drug development, distribution, and surveillance.

Stackable Degrees: Graduate certificates and ala carte courses that meets the course requirements for a degree such as Master's or Ph.D.

Stackable Graduate Certificates: Certificate credits taken by students which may be used later for fulfilling the requirements for the academic programs. Some institutions have a time limit for these acquired credits for these courses to be used towards a program. These credits can focus on specific skills related to the program.

Translational Research: Translate basic research to application to improve patient health. This is translated from theory into practice or from preclinical to clinical application.

Chapter 15
Exposing Learners to Practice:
When Crisis Presents New Opportunities

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ABSTRACT

Clinical education is the center of professional preparation in healthcare fields, linking theoretical knowledge with clinical practice in the minds and behaviors of student clinicians. Clinical education, supervised by educators who are licensed professionals, is essential in the process of creating new professionals. What does a professional training program do about clinical education when the world shuts down? This chapter addresses the context of a private, not for profit university's response to the COVID-19 public healthcare crisis in spring of 2019 and the process by which a graduate training program in speech-language pathology re-organized, and re-visioned, clinical education in that context. The process allowed an upper cohort of students to graduate successfully and on time, engaged a lower cohort of brand-new clinicians in meaningful clinical learning, and taught the program new lessons about what is important in designing clinical education.

INTRODUCTION

The rise of COVID-19 in spring of 2020 put extreme pressure on the already fragile system of higher education in the United States (U.S.). As of mid-March 2021, over 397,000 cases of COVID-19 had been identified at over 1,800 institutions of higher education in the U.S. (New York Times, 2020). With students vacating dorms and campuses for the remainder of the spring 2020 semester, and many not

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returning to campus in the fall as institutions held fall courses online, large numbers of colleges and universities lost a great deal of revenue from refunding or not receiving payments for housing and meal plans. In July 2020, the House Subcommittee on Higher Education and Workforce Investment received testimony from several college, university and educational research association presidents and chancellors. In that testimony it was noted that the higher education industry has been aware of the need for change in several areas, but the COVID-19 crisis accelerated and magnified that need. Common relevant themes that ranged throughout these testimonies were the need for digital access equity for all students, to equip faculty members with strong pedagogy and training for online teaching and learning, and investment in technology (House Subcommittee on Higher Education and Workforce Investment, 2020).

These developments have made it more important than ever for institutions of higher education to use creative problem solving to innovate in order to provide students with the best learning opportunities possible. The College of Education and Human Services (CEHS) at Abilene Christian University (ACU) has committed to developing innovative experiential learning opportunities that are sustainable and scalable. College leadership's response to the challenges of COVID-19 demonstrates the college's continued commitment to do so, even in the midst of the most challenging circumstances.

In this chapter, the authors use the work of the department of Communication Sciences and Disorders (CSD) and their quick pivot from traditional clinical education practices to alternative clinical education programming as a case study for exposing learners to practice using innovative strategies in providing clinical skills training.

BACKGROUND

ACU has a strong commitment to innovation, having launched a well-known mobile learning initiative in 2008 which put smartphones and mobile devices in the hands of every student, and provided training opportunities for faculty in using these technologies (Young, 2011). In the face of the COVID-19 crisis, the university's senior leadership remained committed to using innovative strategies in prioritizing continued student learning. A main goal of the administration was to insure that, as far as possible, students were able to remain on their current trajectory for graduation. For the CEHS, being able to maintain progress for students meant that it was critical to continue clinical training experiences within the health professions programs housed within the college.

In order to support student progress, both university and college leadership committed to providing technical support for all faculty to conduct their courses online and to maintain personal communication with one another and with students. College leadership communicated with faculty in mid-March, asking them to explore what additional technologies might be helpful in supporting their continued work with students when face-to-face meetings were suspended. Additional technological supports such as headsets and professional video conferencing accounts were purchased for all faculty members.

As the center of clinical training for allied health programs at the university, the CEHS faced additional challenges. The CEHS is one of four academic colleges within the university, each of which houses multiple departments, centers, and/or institutes. The departments contained in the CEHS are Communication Sciences and Disorders, Kinesiology and Nutrition, Occupational Therapy, Social Work and Teacher Education. The Center for Speech, Language and Learning (CSLL) is housed within the Department of Communication Sciences and Disorders and provides speech and language treatment services to the community, while serving as a center for clinical training for speech-language pathology graduate students.

As the public health crisis moved forward, clinical sites closed or withdrew from offering clinical training experiences to students. The CEHS Dean consulted with program directors and realized that the allied health programs in the college, which require clinical experiences, would need further financial support in order to assure access to the increased need for clinical supervision which would now need to be provided entirely by the faculty and clinical supervisors in on campus health professions facilities, such as the CSLL. College and university leadership worked together to identify funds that could be used to support the additional expense of a dramatic increase of on campus clinical supervision.

Lastly, there was the work of providing emotional support to program directors, faculty, and students as they navigated the difficulties involved in maintaining practices as demanded by accreditors and attending to the physical and emotional safety of students while creating new training opportunities that would meet the clinical training needs of students. In a university setting that often takes an entire five-month semester or academic year to make any significant change, decisions had to be made within minutes and communications had to be clear, concise, and ongoing.

The framework adopted throughout the response to this crisis was centered on the concepts of growth mindset and adaptability. Dweck (2014) describes "growth mindset" as an individual's perspective that intelligence or talent is something that can change and develop. Dweck further notes that people with a growth mindset tend to enjoy challenges and see them as opportunities to learn and develop new skills (Dweck, 2014). Dweck and her colleagues have also considered how the growth mindset can be extended to organizations. They found that organizations with a growth mindset tended to have more positive cultures, with higher levels of collaboration, innovation and integrity as well as organizational trust and commitment (Canning et al., 2020). Research supports that these cultural norms predict an organization's success, particularly when paired with a norm of adaptability, and this is true even during times of upheaval in the industry. (Chatman et al., 2014). Over the course of the past three years, the CEHS has been focusing on further developing the norms of collaboration and innovation, creating a task force that then launched a full scale interprofessional education (IPE) program developing shared experiential learning and curriculum across the college and its five departments. Collaboration was supported through leadership that focused on team efforts and acknowledgement of the accomplishments of the entire team. College leadership emphasized innovation by encouraging risk taking and trying new things and rewarding risk taking through public praise, and sharing with senior academic and administrative leaders the learning that occurred through the risk-taking process rather than primarily focusing on the outcomes. Lastly, integrity is a value throughout the university, and is further supported in the college through a distributive model of recognition, moving from providing one yearly award to faculty to five yearly awards. In addition, the five departments have been carefully provided with equity in terms of funding for professional development, capital projects, and so forth. Adaptability has been encouraged through the process of the college-wide development of the IPE program, in which every department and a wide variety of faculty members had to work together, adjust to challenges and contribute in order to create a successful learning experience for students. All of these efforts have encouraged a growth mindset within the CEHS.

The leadership team of the college leaned into the organizational norms of a growth mindset and adaptability as the college responded to the pressures created by the COVID-19 pandemic. In order to do this, the college dean worked both individually with department chairs and with the chairs as a team to provide a rapid, effective response to the challenges presented by the pandemic.

ONE PROGRAM'S JOURNEY FROM CRISIS TO NEW OPPORTUNITIES

On February 27, 2020, Dean Jennifer Shewmaker emailed department chairs in the College of Education and Human Services that it would be wise to begin to prepare for a shift to online instruction should face-to-face classes be disrupted because of the COVID-19 breakout. On March 12, an email from the senior leadership of the university announced that all instruction would be provided online for an undetermined period, starting March 22. The majority of university faculty and staff were assigned to work remotely.

For the ACU Master of Science in Speech Language Pathology (MS-SLP) program, the time period between those two emails and after was filled with initially frantic, then gradually purposeful activity targeting a complete redesign of the clinical education program. At risk was the ability of 52 graduate students in the Abilene division of the program to complete their training within the established five-semester time frame. In the week following the university's announcement, the on-campus CSLL was closed to face-to-face visitors, and community clinical placements disappeared as practice settings were required to restrict access to students.

Program leaders knew that second-year students approaching graduation needed to finish academic and clinical practicum certification requirements by May 8, while first-year students needed to engage in all-important initial clinical experiences in order to build confidence and independence as clinicians. They knew that if clinical practicum hours were not provided, second-year students' graduation would be delayed, perhaps by months. This would result in a clinical practicum 'bottle-neck' as those individuals attempted to finish after May 8, holding clinical placements that students in the cohort following them required so that *they* could make adequate progress toward program completion.

The ACU program was not alone in confronting these issues; the same frantic problem-solving was occurring across the country (Polovoy & Law, 2020). Volkers (2020) recorded that during this time frame, didactic and clinical education in the fields of speech-language pathology and audiology in the US (fields encompassed by the discipline of communication sciences and disorders) "shifted dramatically over a matter of days…" (Para. 6). In a discussion of program reactions to these abrupt changes, Kornak (2020) interviewed faculty members who noted how difficult it was to remain optimistic in the context of disappearing clinical placements, and how challenging the situation was for university supervisors. One quote in particular reflected the stress felt by all concerned: "for some programs, it's probably going to be back-breaking. . .this is going to kill momentum and morale for students. . ." (Jessica Sullivan, PhD, assistant professor and graduate coordinator, Hampton (Virginia) University, Para. 9). For some programs, outcomes later in the spring bore out these concerns; in a May 2020 survey of 395 CSD students, 60% of respondents cited "unable to complete graduation requirements" as a top challenge confronting them in this time frame (Volkers, 2020, Para. 7). Fields within the discipline of communication sciences and disorders were by no means the only health sciences fields so affected; a review of the content from rehabilitation and health sciences journals in 2020-21 revealed similar challenges and concerns experienced across professions and training programs. In March 2020, Ostrov asked in an early writing whether clinical training would be a casualty of the pandemic. Writers from nursing education backgrounds wrote of lost clinical rotations and the resulting impact on student nurse graduations in May of 2020 (Lopez, 2020). Bell and colleagues (2020) noted in their discussion of clinical psychology training programs the difficulties involved in maintaining program integrity while managing trainee safety during this period. Puzziferro & McGee (2021) noted that for health sciences educators in general, transforming hands-on laboratory and field-work experiences into remote learning options was a difficult but necessary undertaking in the COVID-19 context.

In this context, ACU program directors realized that the focus of the clinical education program had to be narrowed -- from the broader pre-pandemic emphasis of engaging students in clinical practice in a variety of settings, to simply ensuring that certification requirements were met for each. Nonetheless, the leaders were still determined to provide high-quality clinical learning experiences necessary in order for these individuals to actually become practicing professionals.

When COVID-19 Struck – Challenges to a Clinical Training Program

Forced change to clinical education programs in Communication Sciences and Disorders, and other health professions occurred in programs across the country. Two options were available to most programs: 1) provision of clinical services through alternative service delivery methods, which in the context of the pandemic took the form of telepractice (with telesupervision), and 2) adoption of alternative clinical education methods, using simulated case programs. The Council on Academic Accreditation of the American Speech, Language and Hearing Association (2020) surveyed programs during late spring of 2020 and found that these strategies were adopted by 92% and 89% of programs, respectively. The ACU program utilized (and continues to employ) both.

Reflecting on the programmatic changes that occurred abruptly from March through August 2020 (and through the 20-21 school year), it is clear that the challenges that surrounded and motivated those actions encompassed four areas: accreditation and certification standards, ethical concerns, student well-being, and logistics. The remainder of this section will describe those challenges, and the manner in which they were met.

Certification Standards for Clinical Practicum (Speech-Language Pathology)

Current certification standards require that students complete a minimum of 400 clinical practicum hours in order to become certified. Of these 400 hours, 75 may be completed at the undergraduate level (including 25 observation hours), and 75 may be completed through alternative clinical education experiences such as clinical simulations. Stressed program directors appealed to have these requirements decreased as a means of assisting final-semester students to complete their programs, or to increase the number of clinical simulation hours permitted. In discussing these appeals, the Council for Clinical Certification (CFCC) of the American Speech-Language Hearing Association made the following known to program directors via the Council on Academic Accreditation (CAA):

The CFCC has received many inquiries related to expanding the use of clinical simulations to supplement direct client/patient experience, which the CFCC rejected. As you may be aware the certification standards already allow for up to 75 hours to occur at the undergraduate level and 75 hours to be acquired through clinical simulations, which means only 250 hours of the 400 hours of clinical practicum have to come from direct client/patient care, which can be done through telepractice. The CFCC believes these 250 hours are necessary to ensure students are ready to begin their CF [Clinical Fellowship] experience. (Council on Academic Accreditation in Audiology and Speech-Pathology of the American Speech-Language-Hearing Association, 2021).

In further discussion of the decision to leave the clinical practicum hour requirement at the original level despite student needs and program appeals, the CFCC explained that programs and applicants for certification must also meet the requirements of other agencies, such as state licensing boards and the U.S. Department of Education (who may be said to have based their practicum requirements on the ASHA requirements). ASHA noted that it does not have jurisdiction over these entities (Council for Clinical Certification in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2021).

Furthermore, no modification was made to the types of activities that can constitute a direct clinical practicum hour. To briefly summarize, patients and/or caregivers must be present synchronously with the clinician during the time to be counted (screening, assessments, treatments, patient counseling or caregiver education may be utilized for clinical practicum hours). Activities such as therapy planning, documentation, consultations with other professionals, or materials preparation that occur in the absence of the client/family do not count toward clinical practicum hour totals (Council for Clinical Certification in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2018). Because of these limitations it is possible that only a small portion of the hours spent at a clinical site will be counted toward the practicum total; a reality which exacerbated the difficulties presented by the COVID-19 context.

An area in which the CFCC could and did provide some relief for programs was in the area of telepractice. Prior to March, 2020, telepractice with remote supervision could not be counted toward clinical practicum hour accrual. This changed markedly that month, but the level of synchronous supervision required for telepractice activities to count was 100%, meaning that a supervisor could manage only one student/one session at a time. In a month when university programs were faced with additional funding/budgetary difficulties, the supervision requirement for telepractice was onerous. For comparison, the minimum supervision level for face-to-face speech and language treatment sessions is 25%.

In May, 2020, all program directors were informed that telesupervision could be provided according to the same supervision standards as in-person services; the new accommodations require that supervisors be 100% *accessible* during each session delivered via telepractice, and that a minimum of 25% of the total contact time with each client/student/patient be supervised (Volkers, 2020). This was an important change, as it permitted clinical educators to supervise more than one student/session concurrently. The change made telepractice a more viable pathway for students (particularly those in the final days of practicum who had exhausted their permitted simulation hours) to complete clinical hour requirements. At present, this accommodation is in place until December 31, 2021.

In addition to relaxing the telepractice supervision requirements, a second accommodation made it possible for the ACU program to ensure the graduation of all second-year students attempting to complete it. ASHA allowed up to two SLP clinicians who were actively engaged with one client/patient during a session to count the full hour toward their total clinical practicum hours. Previously, practicum time had to be divided if more than one student participated in a treatment session (Council for Clinical Certification in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2021). Combined with the new telepractice options, this modification was a primary facilitator of the program's success in getting students through the clinical practicum requirements; however, in order to take best advantage of the accommodations, the structure of the clinical education program had to be completely reworked.

Ethical Concerns: Patients, Student Clinicians, and the Clinical Education Process

As it became clear that telepractice would be the primary vehicle by which students accrued clinical hours, decisions regarding how sessions would be conducted had to be quickly taken. The considerations surrounding platform selection were discussed by Slawson and Worthington (2020), focusing on both student and patient privacy concerns. It was necessary that any video conferencing platform and all online reporting systems utilized protected the privacy of patients. At the same time programs had to consider that student instruction, counseling and error correction would take place via these systems and that supervisors had to safeguard student privacy as well. With these considerations in mind the ACU CSLL chose the video conference software for Education plan as a video conferencing platform for use in telepractice because of its enhanced security features, including a waiting room function, encryption, and password protection.

Prior to March 2020, the CSLL at ACU had provided few telepractice-based services. Only one supervisor of the eight associated with the clinical education program had training or experience in provision of teletherapy. In the three weeks between the vacation break beginning on March 9, and the restarting of clinical services on March 30, the director of clinical education and the lead supervisor for this area undertook to train this group in best practices in telepractice. The next task was to prepare those clinical instructors to train student clinicians in the relevant new skills required for this shift in service delivery mode.

Volkers (2020) summarized similar discussions that occurred in programs across the country. The shift from in-person treatment to treatment via camera involved several decisions centering on ethics considerations. Therapy services must primarily be of benefit to the patient or client receiving them; student clinician concerns, though important, are secondary. Therefore, supervisors and clinicians had to make decisions regarding which patients were good candidates for teletherapy, and which were not, regardless of the impact on available clinical practicum hours. If a patient's diagnosis indicated that the person would not benefit from telepractice services, then services should not be provided in that format. Quality patient care had to be the center of this process, even (or especially) in these unusual circumstances (Council on Academic Accreditation in Audiology and Speech-Pathology of the American Speech-Language-Hearing Association, 2021).

Therapy tools and techniques had to be reviewed according to their likely effectiveness in the virtual setting. Some of the ways that basic clinical services were conducted had to be modified. Patients and/or their families had to give informed consent (per the ASHA code of ethics) for services to be provided in this manner, as the quality of services could be impacted by the change in delivery modality. Through this process of deliberation with supervisors and families, students saw Principle 1 of the ASHA code of ethics in action: practitioners have the responsibility "to hold paramount the welfare of the persons they serve professionally. . ." (American Speech-Language-Hearing Association, 2016, Principle of Ethics I, Para. 1).

Along with telepractice, use of alternative clinical education resources came into focus as another solution for programs, and was part of the ACU program's clinical education restructuring plan. Ensuring effective use of simulations in the process of clinical learning is another ethical consideration for training programs. Programs are responsible not only for facilitating the accrual of supervised clinical hours, but also for ensuring that clinical skills outcomes stipulated by ASHA are attained (Council for Clinical Certification in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2018). Summarizing the pertinent research, Dudding and Ingram (2018) note that simulations are a "viable supplement to traditional clinical practice with real patients." (Para. 1). They warn, however, that the use of simulations must be a carefully managed process. Established best practices in use of simulations include not only student completion of hours/experiences, but a pre-brief/debrief process with a clinical educator. Employment of this medium, then, also necessitated training of clinical educators and students in order for this tool to provide a satisfactory clinical learning experience.

In summary, the ethical responsibilities of programs toward students (and their future patients) for ensuring the completion of clinical practicum hours, and more importantly the acquisition of clinical practice competencies, are realities even in the context of a global pandemic. As discussed on the blog of the National Student Speech-Language-Hearing Association (2020), incomplete hours and unmet competencies cannot be rolled into the beginning of the Clinical Fellowship (internship year), which is the final step towards a certification and licensure for a speech-language pathologist. Failure to meet the established expectations translates into consequences that reach beyond the graduate school period.

Student Well-Being

Perhaps the most consequential area of challenge experienced by the ACU MS-SLP program (and certainly by others) had to do with supporting student well-being in this time of global crisis. A few authors within the field have written about student experiences during this time; there was discussion of student stress resulting from changes in how supervision processes, therapy planning, and paperwork were now to be conducted, for example (Slawson & Worthington, 2020). Program leaders and faculty anticipated that there would be significant stress experienced from the loss of clinical practicum placements. Knowing that second-year students were doubting their ability to complete certification requirements (and then enter the workforce as speech-language pathologists), the director immediately sought to reassure them as a group and individually, even before a fully developed plan could be articulated.

As the weeks passed, however, the feelings described had more to do with loss of anticipated opportunities and interactions than with stress. Soon it became apparent that even though students began to feel confident that they would graduate, there was still a grieving process occurring. Students were grieving lost clinical placement opportunities, perhaps for a long-awaited, special setting. They were grieving lost weeks of interactions with peers, from whom they would soon separate in the natural course of graduation good-byes. They were pained over the loss of graduation celebrations. The faculty attempted to compensate for these losses with video conference events and meetings, mail-outs of special graduation gifts, and personal communications, but video-conferenced substitutes could not replace the live experiences students were missing.

First-year students were seeing their immediate futures lived out in the experiences of the cohort ahead of them, months of decreased clinical practicum options, enhanced COVID-19 precautions, modified instructional programs, and fewer opportunities to engage socially with professors and peers. Although the cohort of first-year/rising second-year students did get to return to face-to-face instruction at ACU, and to largely in-person clinical treatments in the CSLL and in the community, much had changed in comparison to their final year in undergraduate studies. This group learned what it was to isolate and quarantine, to engage in surveillance testing and daily symptom-checking, and to treat in personal protective equipment. One member of this cohort described her experiences and feelings in the following words:

. . .Having to switch to online/distance format meant I was not able to have a full externship in the summer of 2020 and had to do many items through Simucase [a simulated case study program]. I was glad

to have the chance of hours, but this format was difficult, time consuming, draining, and very frustrating. I feel as if I didn't learn as much as I wanted by having online clinicals. Again, things could have been worse but I wish I'd had more opportunities such as a nursing home [placement], or longer-in person placements.

. . . COVID has opened my eyes that I miss the connections with friends, professors, families, family members. . . I feel like I "missed out" on those big connections you make during graduate school. I am thankful I made a few connections with a small group of friends before COVID happened. (S. Pringle, personal communication, March 2, 2021).

Faculty and supervisors in the ACU program continue to seek to identify the most effective ways of connecting with and supporting the emotional needs of students in this context, acknowledging that despite all efforts, many feel disappointment as they compare the present reality to what they had hoped their graduate school experiences would be.

Logistics

The previously discussed considerations provided a framework for the challenge of re-creating the clinical program. As plans and strategies for managing the forced changes created by the pandemic were developed, it became clear that the impact of these changes would be extensive. The primary implications of the situation had to be identified so that appropriate prioritization could occur, and necessary actions could be taken; however, this was a fluid situation and constant modifications in plans were necessary. The three areas of focus in program planning were clinical practicum hours, CSLL operational strategies, and clinical education priorities; these considerations were of immediate importance. Once these areas were managed, the program leaders were able to consider the implementation of clinical practicum changes beyond spring 2020.

Clinical Practicum Hours

The clinical aspect of the program is essential; graduate students' success is dependent on their clinical experiences as well as the required accumulation of direct clinical hours. In the process of assessing the needs of students preparing to enter their final clinical rotation before graduating, it was of first importance to have updated hours totals for all students. The final clinical rotation is usually planned to provide a minimum of 75-100 hours over a 7-week period; rather than maintaining that expectation the focus was shifted to what each student needed to complete in their final rotation to attain the required minimum of 400 practicum hours (375 + 25 observation hours).

In the second-year cohort of 24 students, three had all hours completed, and six were identified as having a critical hours gap, requiring 75-125 hours to meet standards. The hours totals of the remainder of students fell between those two extremes. As clinical placements within the community disappeared or were discontinued due to safety concerns, telepractice and simulation hours became the only available options for students to obtain clinical hours. The simulation system adopted by the program was SimuCase, a program designed for training purposes in the field of speech-language pathology which "allows users to observe, assess, diagnose, and provide intervention for virtual patients." (SimuCase, 2021). Originally used in the program for classroom instruction purposes only, it now came into focus as a practicum ‘placement’. It was determined that students who were able to complete their remaining required hours through SimuCase alone would do so, up to the allowed limit of 75 hours for simulations (some students had already completed some simulation hours). Hour totals were closely monitored to prevent excess accumulation of simulation hours. Second-year students who needed hours beyond what could be obtained via simulation were selected to complete a combination of simulation and telepractice hours.

While reviewing options and making plans that would allow second-year students to complete requirements for graduation, it was also necessary to account for the needs of the current first-year clinicians, who were in an active clinical rotation prior to spring break. Of the 28 students in that cohort, 22 were in clinical rotations under CSLL supervisors, and six in community placements. The placements of all 28 first-year students were impacted immediately with the changes that occurred after spring break. It was decided that once CSLL patients were identified as appropriate for telepractice, then each first-year student would be assigned at least one client. Maintaining some level of engagement in clinical practicum, it was judged, would enable these new clinicians to continue to develop practice skills; hours accrual could be a focus for later rotations.

Operational Considerations—Center for Speech, Language and Learning

From an operational standpoint, it was vital to consider above all the needs of clients receiving speech and language services in the CSLL, for whom the program was responsible. Recalling Principle 1 of the ASHA code of ethics (American Speech-Language-Hearing Association, 2016), leaders had to determine how the CSLL would attempt to continue to meet this responsibility once clearance was given to resume operations. Telepractice was the only viable option for continuing services to those clients given the uncertainty of in-person restrictions due to the virus. Factors considered in the process of determining how services would be offered included client appropriateness for telepractice, supervisor/clinician competence, and technology access.

Each supervisor conferenced with their students to review caseloads and determine which clients were appropriate for telepractice services. These determinations were based on considerations of disorder type and severity, home support for sessions, and attentional skills, in accordance with any available research guidance (significantly limited at this time). The clients deemed as not appropriate candidates for this service delivery model were contacted and placed on a ‘hold’ status until clearance was received to return to an in-person delivery model. Those clients determined to be good candidates for telepractice services were contacted, and approximately 90% of those clients/families agreed to move to telepractice services. The remaining individuals declined services, primarily due to lack of technology and/or caregiver availability to manage remote sessions from home.

Prior to this shift, most clinic personnel had limited to no experience with telepractice; it was helpful that one supervisor had extensive knowledge and was available to provide training. To begin, the director of clinical education reviewed supervision/clinical requirements to determine what restrictions would impact the use of telepractice, and to consider how to resolve them in an ethical manner. The supervision team developed and implemented telepractice guidelines, and ensured that signed acknowledgements/consents were in place for each client moving forward. Students and supervisors met with each client/family individually via telephone to provide education on session expectations and technology requirements.

The challenge of technology access and use was considered from supervisor, student, and client viewpoints alike. The director of clinical education identified the educational version of video conference software as the platform most likely to ensure that the highest level of encryption and protection was being employed for therapy sessions; thankfully university leadership acknowledged this need and facilitated acquisition of accounts for each supervisor. Students and supervisors were directed to utilize the waiting room feature of video conference software so that breaches to the sessions could not occur. Students and clients were both instructed on how to set up session locations to improve privacy and a quiet locale for the most effective session. Supervisors confirmed that students had appropriate internet connection/speed, a reliable device with necessary equipment for video streaming, and the knowledge to operate the required systems.

The CSLL provided a variety of demonstrations via telephone and/or email walking clients/families through all the testing processes. In effect the supervision team had to guide clients on video conferencing basics while learning the same skills. Many clients and/or family members needed practice sessions with the students and supervisors to ensure that sessions could run smoothly. As expected, many difficulties with internet and equipment reliability were encountered, and at times treatment sessions could not be completed due to these interruptions. However, the majority of sessions offered were conducted successfully.

Clinical Education Considerations

The final area of focus in telepractice planning was the educational component. The pre-COVID clinical education structure consisted of five rotations throughout the program. Clinical experiences occurred each semester and gradually increased in expectations and independence. The initial clinical experience occurred with direct CSLL supervision while rotations two and four had students in the CSLL and some students in local clinical settings. Rotations three and five were full-time externship opportunities, eight and seven weeks, respectively. The full-time externships allowed some graduate students to stay in local community settings, while other students elected to complete their experience out-of-region, which could include being outside of the state or country. Each semester graduate students were enrolled in a clinical practicum course that focused on integrating theoretical concepts from the classroom into practice in the treatment room. With the significant restrictions placed on externship opportunities due to the pandemic, it was evident that the framework of our clinical practicum program would need to be changed drastically, and part of that change would include depending to a significant degree on telepractice options. The related courses would need to re-focus content to emphasize that area.

Clinically, CSLL supervisors were entering unfamiliar territory with the telepractice delivery model. As previously discussed, there were additional state and certification regulations to consider, such as appropriate intervention approaches, appropriate supervision, and compliance with relevant laws. Supervisors required training regarding the 'dos and don'ts' of remote supervision so that errors were not made which might negatively impact clients and clinicians. Supervisors and students were provided with various resources such as webinars, podcasts, articles, and video classes that addressed how to appropriately provide telepractice intervention across populations, with a goal of acquiring expertise that could be applied in the current situation and in later practice.

The use of simulations for clinical practicum hours required additional considerations in terms of using the program to provide an appropriate educational experience. As of March 2020, none of the resident supervisors had knowledge of how to utilize SimuCase. It was decided that two supervisors would be assigned to simulation supervision, and were provided access to training videos and manuals for SimuCase as well as guidance from the clinical director on requirements. The program priority in this area was to ensure that SimuCase was used strategically, in a manner allowing students to learn about disorders that they would otherwise not have experienced.

SimuCase allows supervisors to get a detailed log of their interactions within the program and to see how long the students spent on a case. Program supervisors learned to use the logs as a monitoring tool to help guide students. They completed additional online training on how to debrief students appropriately, which added to the assurance that the students were obtaining hours and experiences that were equipping them for professional practice.

The classroom portion of clinical practicum could not be overlooked; in fact, instructors needed to ensure that the classroom material covered in the practicum courses for both first- and second-year students helped fill in any gaps in clinical knowledge needed for the current situation. In collaboration with instructors from ACU's Dallas division of the MS-SLP program, coursework was developed for clinical practicum classes (beginning and advanced levels) that was relevant to the current pandemic and related changes to the field. A variety of clinical engagement activities (CEAs) were created to provide students with assignments that would further educate them in the areas of telepractice, implications for their upcoming Clinical Fellowship Years (internships), and residual effects of the pandemic, to name a few. The primary goal of the coursework was to provide students with pertinent information to enable them to function as new professionals in a changed clinical world. With all of the clinical practicum and coursework plans put into effect, the program succeeded in having a 100%, on-time graduation rate for the MS-SLP class of 2020. All second-year students completed the necessary requirements, but the work of re-structuring the clinical education program continued.

Logistics – Summer 2020 and Academic Year 20-21: New Issues

As the summer months began, the impact of the pandemic continued to be felt in all clinical settings. Some agencies were beginning to make arrangements to reopen their doors to students for in-person externships, which expanded clinical practicum options. However, additional modifications were made to clinic and class for students who were either not able to secure an in-person placement or opted out due to COVID-19-related concerns.

The CSLL normally closes during the summer as students engage in clinical practicum rotations via externships. In summer 2020, it was imperative that the clinic continued to operate to ensure that all students participated in some form of clinical practicum, as necessary via telepractice and SimuCase. Resident supervisor availability was discussed, and it was determined that the two supervisors who were trained in simulation cases would continue to implement those formats with this next cohort. The other available supervisors would continue with telepractice supervision. It was also determined that initial evaluations of patients could take place via telepractice (which to date had not been offered due to lack of, and uncertainty about, appropriate assessment measures). Resources provided through the Pearson Assessment Q-Global platform became available free of charge through August 2020 and made possible the integration of new clients into the clinic's census.

As the possibility of some in-person placements became reality, new legal concerns arose. It became necessary to collaborate with the university's legal services department to create an indemnification form. The form affirmed that students were aware of the COVID-related risks connected to in-person externships, and that neither the university nor any facility in which clinical placements were conducted would be held liable should the student contract COVID-19. All students electing to participate in in-person clinical placements were required to complete and sign the form.

Within the program, it was determined to stipulate that should a student become concerned about his/her well-being or health, the placement could be terminated immediately without negative repercussions to that individual. Regular check-ins with each individual student were completed by the director of clinical education to get a sense of how things were progressing and to discuss any concerns the student had. Overall feedback was that students felt safe in their settings and that the agencies/facilities were doing everything possible to ensure that safety was paramount for clients and clinicians alike.

Facilities in the Abilene community, such as West Texas Rehabilitation Center and Hendrick Medical Center, were important collaborators in the program's efforts to provide all students with adequate clinical practicum experiences in summer 2020. These community partners were willing to take on students for short rotations in order to increase the number of clinicians able to obtain an in-person experience. Rather than the typical four summer placements provided by those facilities in Abilene, eight placements were completed by the end of summer. Another twelve students had full time in-person placements elsewhere. Along with the students who were assigned to CSLL for their summer clinical practicum, those who completed a shortened round at an off-site location engaged in clinical simulations in order to compensate for hours gaps, up to as many as 65 hours. At the end of the summer semester, students had successfully completed all in-person placements, and each student obtained the targeted 75-100 clinical hours. No students contracted the virus at their placements.

The 2020-21 academic year has seen clinical practicum models return to more traditional face-to-face service delivery modalities, albeit with windowed masks, protective screens, and social distancing measures in full operation. However, the ACU program continues to make use of telepractice for clients who have concerns about in-person services, or for those who live at a distance. Program leadership is also giving serious consideration to the role that case simulations should play in preparing students to treat low frequency disorders.

MEETING THE CHALLENGES - SOLUTIONS AND RECOMMENDATIONS

Approaching the end of academic year 2020-21 (and the year anniversary of the seismic shift in academic and clinical training in all programs), program leaders are able to reflect back on these months with a sense of relief and look forward to the months ahead. The following strategies were key to meeting the challenges that were presented to ACU MS-SLP clinical training program by the COVID-19 pandemic and are applicable to other health profession programs.

Strategy 1: Two-Way Communication with University Leadership

The importance of open communication pathways between senior leadership of the university (those who control university resources) and health professions program directors cannot be overstated. In order to obtain the additional resources (both personnel and material) that were immediately necessary in order for the program to move forward in March 2020, the ACU MS-SLP program required the constant support of the Dean of the college, who took the program's needs directly to the senior leadership team. Anticipating that a crisis can happen at any time, directors should evaluate their access to senior leadership, and if limited, take action to strengthen that link. The well-functioning system that supported the ACU MS-SLP program during this crisis was built over months and years during non-crisis times, and for that, program academic and clinical faculty are grateful.

Strategy 2: Frequent, Open Communication among Department Leaders

The problem-solving processes that occurred required multiple daily conversations. The department culture within all health profession programs must support a shared leadership model in order to rapidly and effectively solve problems of the magnitude of the COVID-caused shift in clinical education.

Strategy 3: A Clear Understanding of Accreditation and Certification Requirements, and a Means by which Those Requirements can be Clarified and Questioned

The ASHA Council on Academic Accreditation (CAA) provided numerous opportunities for program directors and chairs to meet with the council, to question and to discuss requirements. Their accessibility and the resulting give and take with program directors resulted in changes to telepractice/telesupervision that definitely made possible, in ACU's case, the graduation of second-year students with all their clinical practicum hours accomplished. The program's director of clinical education and the department chair are now much more educated regarding *all* certification requirements, and the rationales behind them. Program directors for health profession programs must prioritize seeking out opportunities to gain this knowledge. This will facilitate future program planning for clinical training in health professions, and also perhaps allow program leaders to advocate for additional beneficial changes as health profession fields move forward.

Strategy 4: Comprehensive, Well-Organized Data Sets of all Relevant Information

The director of clinical education created a structure by which all clinical practicum hours for all students could be quickly viewed and evaluated. This included separate categories for simulation hours (alternative clinical education hours), as they are specifically limited by the accrediting body. Also available was the number of hours per supervisor. Previous accounting systems were less detailed and less frequently updated. Directors of clinical education for health professions can use this model to develop their own well-organized data sets. Having all necessary data ready for easy review will allow quick shifts in case assignments, adding or curtailing simulation hours, and estimating the needed number of additional supervision hours.

Strategy 5: A Team United behind a Focused Mission

Again, the significance of clear communication cannot be over-emphasized in the clinical education component of health profession programs. The communication between directors of clinical education and the clinical education team (supervisors) must be frequent and focused on student hours and skill attainment. Supervisors must be ready and willing to train one another in new skills and then all reach out to train students.

Strategy 6: Organized, Intentional Efforts to Provide Student Emotional Support

The department's academic faculty, as well as the clinical educators, played a significant role in staying connected with students, and staying aware of the status of their emotional well-being. Faculty were encouraged to reach out to their assigned student "mentees" to answer questions and to provide emotional support. The director of the Abilene division of the ACU MS-SLP program met individually with each student more than once to ascertain their well-being, and to make faculty aware of any needs that others could help meet (including such real-life needs as meals for sick students, or for those whose family members became ill or died). When the May graduation ceremony was canceled, program graduates were mailed special graduation packages with gifts from the department and insignia pins recognizing their achievement. This kind of individualized support is crucial in the success of clinical training programs in the health professions, creating a system assuring appropriate levels of support for each student.

Perhaps the most significant lesson learned through this process was that all of the steps taken to meet the challenges of a pandemic required intentional and intense organization and effort. A culture of empowerment in the college made it possible for leaders at every level to step forward to meet previously unheard-of challenges with confidence that they would be supported. The foundation of the growth mindset being created and nurtured throughout the college was undoubtedly critical for success.

FUTURE RESEARCH DIRECTIONS

New Research Directions

New research questions and agendas are now taking shape across the country and the globe, as clinical training programs in the health professions move forward into a future shaped by the pandemic of 2020-21. The experiences lived during this season can expand faculty members' and practitioners' visions of training and service delivery models for speech and language pathology and other health professions--if leaders in these fields are brave enough to walk toward that new vision.

Telepractice is one area that demands university programs take a closer look. Volkers (2020) reports that prior to COVID-19, 91% of faculty did not use telepractice/ telesupervision; that statistic has since shown a pendulum swing, to 60% of faculty now routinely using it. Volkers notes that some faculty members view this shift as a "bellwether of a training evolution" (Para 8). At ACU, the MS-SLP program was not the only program that quickly pivoted to telepractice for clinical training; other health professions in the CEHS, such as dietetics and athletic training, also used telepractice for clinical training during the pandemic, and anticipate continued use in the future.

Abilene Christian University (Abilene campus) is located on the edge of rural west Texas, where treatment access is known to be limited. An investment in teletherapy equipment and training could position all of the health profession programs in the college to become leaders in serving underserved populations. Again, Volkers (2020) notes that embracing teletherapy and telesupervision could engage faculty and students in more diverse and comprehensive clinical opportunities, across age groups and disorder areas (perhaps with specialty clinics or providers.) There is reason to believe that this new direction will positively impact both student clinicians and patients; early reports of student and clinical outcomes due to the explosive growth of telepractice are good. (Slawson & Worthington, 2020).

However, there are questions to be answered in order for telepractice to be implemented as a new, even primary, training model for programs: What are the applicable standards for telepractice and telehealth in our fields? What criteria do we use, and teach, to determine (beyond professional judgment) what types of patients are or are not candidates for telepractice in each health profession? Are there disorder types that are best served via teletherapy? What specific modifications in training address the differences between in-person and teletherapy services? The questions multiply daily, and have important implications for training programs within health professions. Programs are seeking those answers.

Similarly, the use of clinical simulation as a way of expanding training opportunities is becoming a focus. The field of speech-language pathology has not been as quick to adopt simulations as a training method as other healthcare fields; that is very likely to change after the experiences all health profession fields have shared in the past year. Volkers (2020) points out that simulations allow learning with minimal risks. To quote from a student response to the learning they achieved via simulations: "Though Simucase was hard, I did think it was nice to have practice with looking at assessments and patients that I may not have in the future. . . I was able to mess up and learn from those mistakes with a simulation rather than a real person. I am hopeful [this] will help me through my years as a therapist" (S. Pringle, personal communication, March 2, 2021).

It is also important to note that the possibility for training in low incidence disorders through simulations expands clinical training options beyond what may typically be available to any one program in health profession fields. Again, more research is needed to support best practices in use of simulations for training speech-language pathologists and building on what has been learned from other healthcare professionals will be key. How do simulations improve the abilities of novice clinicians to treat complex disorders? Are there disorders for which simulations cannot be effectively used? How can we best use simulations to engage in interprofessional education, and model interprofessional practice (something which has been difficult to achieve during the pandemic)?

The COVID-19 pandemic could have damaged the healthcare fields represented in the CEHS and the training programs that serve them significantly, and the post-pandemic state of these fields is still to be determined. But there is reason for optimism. Law et al. (2020) summarized the results of a series of interviews with speech language pathology practitioners across settings, and many of their statements ring true for other health professions and higher education as well. They speak of profound and lasting change, and yet, a "historic opportunity" (Para. 24) to renew the field to bring in new and impactful practices while maintaining previous, evidence-based strategies. That is the way forward.

CONCLUSION

As Canning and colleagues (2020) note, organizational mindset is a core belief that is fundamental to the way that people within the organization think and act. The development of the growth mindset within the CEHS and its departments was key to the successful response to the challenges presented by COVID-19. Having already embraced the values of collaboration, innovation, integrity, and adaptability, and through those processes established the trust and commitment of the faculty and staff, the CEHS was able to view the obstacles presented to clinical training by COVID-19 as surmountable. This mindset allowed the CSD and other graduate training programs in the healthcare fields to quickly pivot their training and creatively solve problems, evaluating useful tools, new ways of approaching providing service, and new ways of supervising services. In this fluid environment, as higher education and clinical training emerge from the COVID-19 crisis, it is imperative for institutions and clinical training programs to intentionally nurture a growth mindset within their organizational culture in order to be prepared to meet emerging needs with innovative solutions.

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KEY TERMS AND DEFINITIONS

Accreditation: Being officially recognized or approved of by a professional accrediting body designed to ensure quality of programs.

Allied Health: A broad group of health professionals, distinct from medicine and nursing, who use scientific principles and evidence-based practice for the diagnosis, evaluation, and treatment of acute and chronic diseases; promote disease prevention and wellness for optimum health and apply administration and management skills to support health care systems in a variety of settings.

Clinical Education: Educational programs that provide developing professionals with practical and skills-oriented instruction under the supervision of a skilled practitioner.

Clinical Training: Experience and instruction in supervised provision of direct patient care in a health care institution.

COVID-19: An infectious disease caused by a newly discovered coronavirus. Most people infected with the virus experience mild to moderate illness and recover without requiring special treatment. Older people and those with underlying medical problems may develop serious illness.

Educational Innovation: New educational products, processes, strategies, or approaches that improve significantly upon the current state and are scalable.

Ethics and Clinical Training: The application of the science and understanding of morality in training of healthcare or other fields with the goal of improving the quality of patient care.

Growth Mindset: People's belief that their most basic abilities can be developed through their own efforts and learning.

Healthcare Education: Educational programming designed to aid students in gaining knowledge, skills, values, and attitudes for maintaining and improvising the health of their patients/clients.

Higher Education: Postsecondary education usually affording a named degree, diploma, or certificate of higher studies.

Pandemic: A disease prevalent across the world.

Chapter 16
Challenges in Pharmacy Education With Limited Resources During COVID-19:
ASEAN Perspective

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ABSTRACT

The rapidly emerging COVID-19 pandemic resulted in the need for rapid and extensive changes in the education programs of universities. This chapter reviews the changes in teaching and learning made by pharmaceutical faculties in six universities located in the Association of Southeast Asian Nations (ASEAN): Mahasarakham University (Thailand), Taylor's University (Malaysia), University of the Philippines-Manilla (Philippines), Hai Phong University of Medicine and Pharmacy (Vietnam), University of Health Sciences (Lao PDR), and Sanata Dharma University (Indonesia). The authors discuss adjustments that were made based on educational contexts, planning and infrastructure, educational processes, and products and outcomes. Each university provides a specific story concerning lessons learned in responding to the pandemic. The chapter concludes with changes that will be employed in future emergency situations, as well as those that will continue to be incorporated with the resumption of normal operations.

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INTRODUCTION

Situations that Impacted Educational Organization

The coronavirus (COVID-19) pandemic tremendously impacted health worldwide. On March 11, 2020, the World Health Organization (WHO) declared the global outbreak a pandemic. Universities in the Association of Southeast Asian Nations (ASEAN) responded by promptly taking actions to slow the contagion and change educational processes depending on governmental polices and specific adaptations to individual situations. Since WHO recommended social distancing as one of the critical strategies to reduce the spread of COVID-19, pharmacy schools needed to be closed to adhere to this measure and remote teaching was required to maintain learning experiences and provide education for all students. The experiences of universities located in six ASEAN countries of varying populations, geography and COVID-19 incidences are discussed in this chapter: Taylor's University (TU), Malaysia; Mahasarakham University (MSU), Thailand; University of the Philippines Manila (UPM), Philippines; Sanata Dharma University (SDU), Indonesia; University of Health Sciences (UHS), Lao PDR; and Hai Phong University of Medicine and Pharmacy (HPMU), Vietnam. Characteristics of the six schools of pharmacy are shown in Table 1.

BACKGROUND

Challenges of Traditional Methods of Teaching during COVID-19

The teaching styles vary among pharmacy schools in the six universities. The most typical style is in-class face-to-face teaching in classes varying from 30 to 120 students. Face-to-face teaching is clearly a teacher-centered method but, with limited resources in ASEAN contexts, this traditional method is most used. However, various pharmacy schools do employ active learning approaches. At HPMU, active teaching/learning processes include allocating more class time for questions and answers, providing students pre-class assignments necessary for them to answer questions in class, and use of role playing. Some faculty members use digital technologies such as Kahoot! (2021) (a game- based learning platform) and flipped classrooms to facilitate student engagement during face-to-face classroom sessions.

In general, it is necessary to introduce clinical skills in laboratory activities before clinical practice experiences. The six schools use various active learning activities including case-based discussions, problem-based learning (PBL), team-based learning (TBL), clinical case presentations, reporting, group activities, fishbowls, simulated and standardized patients, actual/simulated chart review and monitoring, and actual/simulated patient counseling in varying combinations. Generally, small groups (6-7 students) have been used in laboratories to allow students to interact with teachers in the class and receive feedback. For example, Powell et al. (2019) demonstrated that small-group active learning made students more proficient in understanding and applying core concepts.

Activities in science laboratories are necessary for pharmacy students to develop skills for using equipment for compounding and quality control. Therefore, all pharmacy schools must provide such courses for students to practice achieving professional competency. Combinations of traditional and active learning are also implemented in science labs. Laboratory sizes vary from 8 to 60 students in the various schools based on laboratory capacities.

Clinical practice experience requirements vary in design, length, and practice locations, as can be seen in Table 1. Typical practice sites include hospitals, food and drug sectors, manufacturing facilities, health centers, community pharmacies, drug distribution facilities, and national analytical centers. Due to COVID-19, clinical practice experiences providing direct patient care and other learning experiences were affected because students were not allowed at practice sites. The exclusion of students from practice sites limited the development of communication skills, clinical skills, teamwork, and confidence.

Moreover, some universities conduct interprofessional education (IPE) with medical students and nursing students, such as case-based learning at SDU and MSU. At UPM, IPE is done with medical, nursing, public health, and other allied health professions students in selected communities as part of the Community Health Development Program. Community-based learning has been designed in most of the six ASEAN universities to develop students' soft skills.

For student assessment, in-person paper-based exams were commonly used in the pharmacy schools of the six ASEAN countries before the pandemic. Other forms of assessments include hard-copy reports and thesis submissions in printed form. Assessment methods also include objective-structured clinical examinations (OSCEs), objective-structured practical examinations, laboratory exercises and oral examinations. These procedures became a significant challenge during the COVID-19 pandemic as face-to-face interaction between students and teachers was limited.

When the COVID-19 pandemic required universities to close, the prompt switch to emergency remote teaching (ERT) was challenging for faculty and staff who had never used such technology. Although UNESCO (2019) endorsed distance learning solutions, with most being free and available in multiple languages, all six universities still faced many limitations in achieving learning outcomes. Most ASEAN universities have limited internet access in their campuses, limited technology for use in routine teaching, and limited familiarity with distance learning. Moreover, most students and staff could not afford to have their own electronic devices. For many the environment at home is not suitable for studying or work, and internet access is very limited to non-existent in rural areas.

The six ASEAN universities have different characteristics. MSU is the biggest based on the total number of students, while the smallest university is UHS. The oldest faculty of pharmacy is in UPM. The six-year Pharm. D. program is provided only by MSU. TU offers a four-year Bachelor of Pharmacy program, while the rest of the universities provide five-year pharmacy programs. Two universities (HPMU and UPM) provide only health sciences programs. Other differences between the universities in terms of workforce and number of students are shown in Table 1.

Factors Requiring Adjustment during COVID-19

The responses to the COVID-19 situation were different based on the context of the six ASEAN universities. All universities mainly followed local policies in each country under the directions of the universities' administrative teams. Top-down strategies were used to implement policies during the pandemic. For example, UHS employed a top-down strategy from a vice president, a dean, and administrative team who ordered faculty members to develop training programs for using online programs after considering faculty members' abilities, and available equipment such as computers/notebooks as well as internet connectivity. At MSU, the administrative team of Pharmacy faculty worked with the university team to implement policies, traveling restrictions, and penalties, and provided support to help students and staff. At SDU, changes in policies during COVID-19 were determined by the rector, dean, head of study programs, and other relevant officials, with input from all university members. The other universities used varying approaches for decision making. To respond to COVID-related changes, faculty members had to adjust to learn new platforms, and manage students and arrange courses differently. Students had to change their lifestyles to take more responsibility to study from home. They needed mobile phones or other tools to access learning online.

The six ASEAN universities have similar cultures that foster helping each other by working productively in teams. This resulted in prompt responses when university leaders called meetings, with plans rapidly formulated and implemented. These similarities in culture helped ASEAN universities cope with COVID-19 and helped fellow faculty members, administrative staff and personnel, and students who were experiencing various difficulties such as remote learning set-up, financial concerns, and need for health care.

The provision and financing of needed health care differs among the various ASEAN nations. Thailand's policy on universal health coverage (UHC) provides Thai citizens with free essential health services at all life stages (Sumriddetchkajorn et al., 2019). Since MSU has its own university hospital, Suddhavej Hospital, all students and staff could easily access health care services. In Lao PDR, the government provided free COVID-19 tests for everyone who was at risk of COVID-19 infection and free treatment for anyone infected. In response to the travelling restrictions imposed during the pandemic, pharmacy departments in all the Ministry of Health hospitals in Malaysia waived previous fees for home delivery of medications. The Philippines provides a health insurance system (PhilHealth) for UPM employees which shouldered the expenses due to COVID-19. The University of the Philippines-Philippine General Hospital provided free consultations and testing to the community, and UPM employees and students. In Indonesia, patients with COVID-19 are included in extraordinary events and the government pays the cost of treatment and other medical expenses. Vietnam's policy on universal health coverage supports health care as a basic need. In 2020, 90.7% of Vietnamese people (approximately 85 million) had health insurance (Kiet, 2020).

Impact on Students' Lives

ASEAN universities are cultural hubs where students are brought together from different areas/islands in their countries (such as in UPM and SDU) or from outside their countries (such as HPMU and TU). Recently these unique ecosystems have been significantly impacted by the rapid outbreak of COVID-19, creating future uncertainty for universities and jobs. Student housing was particularly impacted.

Most pharmacy students from the six ASEAN universities live in dormitories. Some universities provide dormitories on their campuses (e.g., MSU), while students in other universities, for example TU, rent their own private accommodations near the campuses. At HPMU most students live in dormitories or rented houses on or around the campus. About 16% of students are from Hai Phong City and live with their parents. The remainder of students come from other cities and provinces in Vietnam and need to rent houses or stay in dormitories. Students in the other ASEAN nations generally have similar accommodations.

The COVID-19 pandemic posed numerous challenges related to student accommodations. For example, during the 'hot period' at HPMU (April 2020) dormitories were used to provide places for quarantine of people coming back from other countries. Students were asked to return to their homes and learn online. However, due to travel limitations, some of the students could not return home and faced difficulties in finding other places to live. The University's leaders had to work more closely with the student association to provide timely support to those who remained in Hai Phong.

At UPM, ongoing 2nd Semester classes were suspended in March 2020 when the Department of Health announced the first case of local transmission. Students were not able to travel to their provinces due to the ban in all domestic air and sea travel. Land travel also was difficult due to halting of public transportation. Thus, students stayed in their dormitories or condos. When the resumption of classes became impossible, students were then allowed to go home as soon as travel bans of domestic airlines and sea travel were lifted and they continued their education from their homes remotely.

Another impact was the suspension of the semester at MSU. Thailand allowed students to return onsite and attend in-person activities when the number of COVID-19 cases declined. However, many students complained about extending the school semester since the university's schedule was longer than the governmental announcement. They had to stay on campus longer, increasing their housing, electricity, and other costs.

SOLUTIONS AND RECOMMEDATIONS

Measures Taken by Universities to Contain COVID-19

Universities in ASEAN countries worked in collaboration with government and local health officials to implement policies for coping and support, contact tracing, recognizing signs and symptoms of COVID-19, screening, and testing. Responses of the six universities are summarized in Table 2.

University Teams

Based on governmental policies, some universities did not have their own committees to respond to COVID-19 pandemic, but rather followed higher-level authorities, such as in Lao PDR where UHS responds to a committee in the Ministry of Public Health. In Malaysia, TU followed the Movement Control Order (MCO) to close the campus based on the nation's Prevention and Control of Infectious Disease Act 1988. Some universities set up committees to rapidly respond to the pandemic. For example, at MSU the Coordination Center for COVID-19 Administration was established and worked to prevent the spread of the coronavirus. The committees have a role in educating and coordinating faculty members and students concerning prevention and control of COVID-19. At HPMU, the Steering Committee on Prevention and Control NCOV (Novel Coronavirus) established and started an education campaign for faculty members and students. Several training courses for students, faculty members, and health care workers were presented on the prevention and control of the pandemic, and to prepare human resources for the country when needed (supported by WHO Vietnam in March - June 2020). An emergency team in SDU carried out responsibilities involving three areas: academics, health, and student affairs. In general, the academic team guarantees the continuity and quality of online lectures. The academics team's job is to facilitate lecturers who choose online courses and solve problems related to learning. The health team oversees procedures to prevent the campus area's coronavirus spread, including necessary medical actions. The student team takes care of all activities that involve students, including rescheduling student activities that affect many people, increasing student knowledge of the coronavirus, implementing healthy lifestyles for student residences, and providing health assistance funds for students in need. The six universities were set up differently for supporting information technology (IT) as shown in Table

3. For example, in Vietnam, WHO Vietnam provided technical assistance; thus, HPMU developed an online training course on "Prevention, Control and Clinical Care for COVID-19 at Primary Care Level".

Universities Promptly Closed – Faculty and Staff Worked from Home

The responses of six ASEAN universities to the pandemic were related to laws announced by governments to prevent and control COVID-19. All six universities promptly closed; however, school closures were different based on the severity and numbers of new COVID cases. During this time, universities implemented work from home policies to comply with social distancing, closed open interaction facilities (canteens, sports facilities, and student halls), and began online emergency remote teaching (ERT) with different lengths based on the semesters in each university as shown in Table 1.

Modes of instruction included a mixture of in-class teaching, labs and ERT at UPM, SDU, and MSU. Only UHS and HPMU were able to keep in-class teaching on regular semesters. Faculty at SDU and TU worked from home and taught online. A SDU policy was issued for faculty members to convert to online learning and midterm exams, instead of face-to-face. TU shifted all courses to be fully online while SDU provided options; staff could access the internet from home or choose to come to campus for teaching online. However, the onsite labs for research (e.g., research thesis and faculty research) operated on campus following strict protocols beginning in July 2020. Working from home was difficult for UPM due to natural disasters for the whole year, and it was impossible to do ERT without electricity. During times of remote operations, the universities staffed their administrative offices with a small workforce of essential personnel. The pandemic caused a lot of research to be delayed for all universities. Given potential impacts on students' graduation, universities allowed students/staff to come and use science facilities with a strict protocol; temperature $<37.5°C$ ($<99.5°F$), wearing masks, no physical contact activities, and maintaining a minimum distance of 1.5m (4.92 ft) during interactions. With good adjustments, all universities were able to complete semesters in 2020.

Planning and Infrastructure

In normal situations, the six schools of pharmacy provide comprehensive teaching for pharmacy students with lecture courses, laboratory work, and clinical skills training. Some schools are increasing the emphasis on student-centered learning. The mainstream of pharmacy education is directed to improve clinical skills by various strategies, such as PBL, project-based learning, TBL, and bedside teaching. Infrastructure support such as smart classrooms, small group discussion conference rooms, and simulated and standardized patients continues to be implemented and evaluated. Lecturers and staff have consequently trained to improve their teaching skills. Online modules, courses or e-learning are developed differently in each school.

Different learning management systems (LMS) are being used in the ASEAN countries, including Canvas (2021), Microsoft Teams (Microsoft, 2021b), Google Classroom (Google, n.d.a), Moodle (n.d.), and virtual learning environments (VLE). In the case of TU, TIMeS (Taylor's Integrated Moodle e-Learning System) (Taylor's University, 2021) has been used for five years as a medium for e-learning. Elsewhere, most lecturers and students were unprepared for live streaming with software such as Zoom (Zoom Video Communications, Inc., 2021), Google Meet (Google, n.d.c) or Cisco's Webex (Cisco, 2021). Due to the lack of experience using these platforms, many schools provided emergency LMS training for lecturers and students to ensure that the best learning environment was provided.

Training courses on LMS and live streaming from information technology (IT) teams were implemented with both self-learning video on demand and onsite training. The lack of technological devices and internet connections are primary concerns in all ASEAN countries. Some schools, such as MSU and UPM, did surveys to assess students' level of preparation for remote learning. The survey questions assessed availability of devices, internet access, skills in using technology, and the need for any assistance for remote learning. This survey allowed the school to identify and find solutions for students needing help.

Some universities provided an extra budget to support online resources. MSU approved extra mid-year funding for procurement of IT resources such as live streaming accounts, wireless microphones, webcams, and video recording studio infrastructure, as well as sanitizing equipment. SDU provided subsidized funds for faculty members and to buy/install internet resources. UPM also invested in online sources for their libraries. More e-books and online references were purchased, and the library was improved so students can access the pharmacy library from their homes using a secured pathway only for enrolled students.

Support for Faculty and Students

Scholarships and Reductions in Tuition and Fees

During the COVID-19 outbreak, economies of the various ASEAN nations declined, and many students and their families struggled with living expenses. MSU provided 1,500 scholarships to students of approximately 100 US dollars each. The university also approved an emergency budget for part-time student stipends as research assistants or other faculty-related jobs. For students who were in their final semester before graduation and could not complete professional practice training due to the lockdown and travel restrictions, the university extended the date for completion of coursework to another semester without additional fees. Tuition and fees for undergraduate and postgraduate students were also reduced to 50% during the third semester of academic year (AY) 2019 (April – June 2020) and 10% for the first semester of AY 2020 (July – November 2020). Similarly, at SDU in Indonesia, waivers were provided for students affected by the pandemic. Furthermore, students received internet subsidies from the government and university to support their academic activities with free access to several learning websites, including Sanata Dharma's LMS. There were no tuition and miscellaneous fees for state and local universities in the Philippines including UPM due to the Free Tuition Fee Law, beginning with AY 2018-2019. Unlike other Universities, TU did not offer tuition fee waivers to students and, instead, channeled extra funding to rapidly scale up technology infrastructure capacity to facilitate effective e-learning.

Providing Students with IT Devices and SIM Cards

Support for students needing IT devices was particularly provided by UMP which launched an "Iskompyuter" Project. "Isko" is a Filipino term for scholar. This was a fund-raising project to provide computers and tablets to students who needed them. The UP Pharmacy Alumni Association and UP Pharmacy Alumni Foundation raised funds from the alumni and donors to provide 15 brand new laptops, lend 12 new tablets, and provide USBs containing course materials to students who had problems with devices or internet connections. The remote learning focal person had also signed a partnership with Smart Telecommunications, one of the biggest phone companies in the Philippines, to provide free "Infocast" or broadcast messages among students including free polls through SMS. SIM cards were also provided to students to receive the free broadcast messages from their teachers (as shown in Figure 1). Donations such as Mobile Wi-Fi and SIM Cards from another phone company were given to deserving students.

Training for Faculty Members and Students for Remote Instruction

This pandemic has presented unique challenges for educators to design and implement teaching and assessment activities within the entirely new online environment. In Malaysia, Thailand, and Vietnam, universities supported faculty members via training courses with timely assistance from support staff during the initial period of online teaching. For example, at TU in Malaysia, a two-week academic professional development training was held where exemplars were invited to share best online instructional practices over diverse teaching and assessment tasks. The faculty members then applied what they had learned for their individual modules. These measures instilled confidence in instructors to get started with various online teaching activities such as facilitating online student group work and research projects, setting up online assessments, performing online grading, and using student-created video presentations or reflective journals for summative assessment. UPM provided lectures to faculty members by the UP-Interactive Learning Center to assist in the creation of course packs and online lectures.

Returning Students to Campus

To minimize COVID-19 spreading, some universities announced the prohibition of travel in accordance with government orders. Quarantines and travel restrictions were enacted by government orders in the various countries, as shown in Table 2. Quarantine procedures varied by nation and locality, and were generally 14 days in duration. Travel restrictions also varied and were based on local and national conditions, including border closings, movement control within countries, and travel by plane and train. In early 2021, some countries enacted more stringent restrictions due to worsening local conditions.

The return of students back to their university campuses posed challenges for all the universities. Except for UPM, schools entered the recovery phase in May or June 2020. Campuses were allowed to reopen for in-class activities with social distancing required. For example, at TU, the school was subjected to a temporary restriction of no more than 30% of the total student population on campus at any time as shown in Table 2. This physical distancing requirement greatly reduced TU's classroom capacities. Furthermore, some local and international students were unable to return to campus due to border closures, health advisories, and quarantine restrictions. To ensure learning continuity for all students, TU redesigned the instructional approach to 'borderless classroom'. Under the concept of borderless classroom, instructors taught in physical classrooms where some students attended in-person classes on campus, while others attended the same classes remotely via live streaming.

Screening processes were implemented by all ASEAN universities in conjunction with local governments. The schools of pharmacy arranged for temperature checking and provided alcohol gel for students before entering class. At the start of the COVID-19 pandemic, masks and alcohol were scarce in many universities. Universities (e.g., SDU, MSU) provided several cloth masks for faculty members that could be used repeatedly. The schools of pharmacy were requested to produce alcohol gel or hand dry sanitizer to assist the campus, hospitals, government organizations, and communities.

Educational Process Changes

As mentioned above, remote teaching presented challenges for most schools in ASEAN countries due to the lack of digital skills, electronic devices, and internet access. Moreover, these schools have primarily focused on face-to-face learning for decades and lacked experience with this learning type. Due to these limitations, different strategies were designed and implemented by ASEAN countries to maximize the remote learning experience for students.

Distance learning programs originated in the late 1800s and have continued to evolve and expand. McIssac & Gunawardena (2001) have discussed the development of distance education to meet an array of educational needs across various nations and cultures. Although pharmacy education in the United States has primarily focused on in-person learning, over the past 20 years additional pathways have been employed to expand educational programs. The typical process has been for pharmacy schools to develop satellite campuses at locations away from the main campus, with such programs employing technology with varying mixes of synchronous and asynchronous delivery. However, in 2001 Creighton University created a distance pathway for its Doctor of Pharmacy program which students can complete remotely with only a few visits to the main campus.

While new approaches to educational delivery usually involve careful planning prior to implementation, changes to ERT had to be quickly implemented by each of the six ASEAN universities based on their contexts and resources. Prior to the pandemic, none of the universities had experience with online teaching in regular course delivery but may have incorporated programs or applications for engaging students in active learning in class. Thus, the COVID-19 pandemic was a big crisis for ASEAN universities requiring adjustment of teaching for their students. TU had the facilities and technology systems for online teaching in place before the pandemic along with a dedicated team of support staff for blended learning initiatives (Hrastinski, 2019). TU's move was aligned with the Malaysia Higher Education's Blueprint 2015-2025 for globalized online learning (Malaysia Ministry of Education, 2015) for transforming the higher education system in the country. Even though they did not use technology in normal teaching for undergraduate students, they were able to make the emergency transition to remote teaching without too much difficulty. In contrast, UHS had limited facilities and support, which made remote teaching difficult. Fortunately, the lockdown in Lao PDR was short and they were soon able to restart in-class teaching. The remaining universities had been introduced to online instructional platforms but had not fully developed them. After the arrival of the pandemic, they were able to promptly invest more money for online platforms, provide training for staff and students, and to move forward with ERT.

From the forgoing discussion it is evident that each university had to make significant COVID-related adaptations. The educational process changes in six ASEAN pharmacy schools during the COVID-19 pandemic are discussed below.

Program and Curriculum Adjustments

Changes in Schedules and Course Delivery

During the first wave of the pandemic in March 2020, many schools closed initially for a week and hoped to reopen soon. However, it took much longer to control the spread of the virus in the ASEAN countries. Consequently, all schools suspended in-class activities and either rescheduled them or changed immediately to ERT. Since the pandemic occurred in the middle of the semester, most schools were not prepared for this. Thus, urgent curriculum committee and faculty meetings were set up to find solutions in all schools.

To maintain student learning experiences, most lecture courses were retained in the semester with purely remote learning as the method of teaching in schools where technology was available. However, remote teaching could not replace the quality of face-to-face teaching methods for some learning activities, including laboratory activities and practical training, particularly pharmacy clerkships/internships. Pharmacy students must have direct patient-pharmacist relationships to strengthen their clinical skills. Moreover, some activities need special tools/devices to provide learning experiences, such as a drug formulation laboratory. Many pharmacy schools in the Philippines, Thailand, Vietnam, and Lao PDR transferred these activities to following semesters, while SDU changed these activities to video on demand. MSU, TU, and UPM uniquely redesigned on-site activities in a hospital to remote teaching using medical record simulations. UPM redesigned laboratory courses to facilitate the completion of these courses remotely. Laboratory activities were decoupled from course lecture components, with specific laboratory sessions transferred to another semester when face-to-face sessions could resume. Most universities delayed practice placements from the summertime and resumed them when conditions permitted. Various approaches used to rearrange schedules are shown in Table 4. In general, ASEAN universities redesigned instruction to integrate online teaching and moved course content, laboratories, and practice experiences to later times when in-person activities could be resumed after the COVID-19 outbreak subsided.

Changes from In-Person to Online Lectures

To respond to the crisis, ERT through a variety of formats and platforms, mainly with the use of the internet, was implemented. Most countries have digital resources and LMS that support virtual classrooms for distance learning. This allows teachers to interact with their students and provide learning activities online. It also enables course management, tracking of learning, assessment, communications, and scheduling of classes without the constraints of time and place.

Many platforms have been used among the ASEAN schools, such as TU's TIMeS (Taylor's University, 2021), which is an LMS platform used for instructors to post learning materials along with lecture recordings and other online activities. Follow-up virtual consultations were then held on a weekly basis for students to reflect on what they have learned remotely, setting the stage for a more in-depth discussion. The strength of this instructional approach is that students access lecture notes and additional reading materials before attending a virtual discussion session and can learn more (about the topic area; this aligns with TU's "teach less, learn more" philosophy. The other schools used a variety of virtual platforms including Moodle (n.d.), Edmodo (2021), Google Classroom (Google, 2021a), and Microsoft Teams (Microsoft, 2021b) for managing classes. Facebook (2021a) and WhatsApp (2021) were also used to manage classes in some schools. Zoom (2021), Google Meet (Google, 2021c) and Webex (Cisco, 2021) are commonly used for video conferencing, with Zoom (2021) being preferred due to familiarity and ease of use.

Most schools utilized a hybrid of recorded lectures and synchronous lectures for remote teaching. Recorded lectures are mainly posted on the LMS. Some teachers use YouTube (n.d.) to publish teaching materials for students (at SDU, MSU) because it is easy to use and allows students to choose the quality of video if they have a slow internet connection. Unreliable internet connections and internet access are significant problems among ASEAN countries. Thus, utilization of recorded lectures provides flexibility for students and allows them to learn and watch lectures anytime and anywhere as students are likely to have home-based internet and/or may share internet service with others. This approach also uses lower bandwidth compared to synchronous lectures that demand higher internet speeds. The limitation of recorded video is that it provides one-way communication and lacks feedback and interaction between teachers and students. Some faculty members use web-based discussion activities on LMS as an alternative way to encourage interaction among students and faculty members, as this method requires lower bandwidths. Questions and answers can be conducted via WhatsApp (2021) groups to help students who have smartphones but no other technology devices. Some pharmacy schools, such as UPM, utilize software such as MyDispense (Monash University, n.d,) for their dispensing laboratories. This is free software developed by the Faculty of Pharmacy and Pharmaceutical Sciences at Monash University and helps simulate real-life situations in pharmacies.

Synchronous lectures can be considered as virtual classrooms which are delivered using video conferencing allowing many students to attend the class remotely and students to actively interact with teachers and their classmates. The various video conference platforms incorporate a wide variety of features allowing for sharing files, audio, an interactive whiteboard, polling, and a chat box for sending messages simultaneously. Breakout rooms can also be used for small group discussions and pharmacy practice laboratories, allowing for more private opportunities for students to interact with peers and instructors. However, breakout rooms require reliable high bandwidth internet service. Strategies to conserve bandwidth include turning off cameras and using the lowest video quality when recording.

To help students having problems connecting to the internet and/or who lack proper devices leading to limited access to synchronous lectures, alternative activities were developed. UPM provided worksheets in the LMS for students to download and complete that included practice problem sets. UPM also mailed students materials on USB flash drives containing the teacher's slides, assignments, and other related materials.

During online lessons, instructors usually pause to engage with students to ensure these students stay connected, and to respond to any questions posted online. Furthermore, online students were able to observe and participate in practical and clinical skill training, where demonstrations by instructors in laboratories were broadcast live to students in remote locations. In this way, technology harmonized the learning platform across the population of students in different spaces, be it those in the classroom or those learning from home, so that both groups experienced similar lecture format and level of engagement throughout their lessons. MSU also implemented a similar strategy to adhere to social distancing measures and provide opportunities for students to have in-class activities so that they could interact with other students/faculty members closely.

Changes in Methods of Practicing Clinical Skills and for Rotations/Clerkships

It was challenging to teach clinical skills to pharmacy students during the lockdown periods because these skills required clinical experience at practice settings and patient-pharmacist interactions. During the pandemic, many hospitals/practice sites restricted the presence of pharmacy students to adhere to social distancing measures in order to reduce exposure to infected cases. Thus, traditional pharmacy practice experience was impossible for most schools. This left pharmacy faculty members no choice but to reproduce hospital ward learning environments and shift such learning activities online. Pharmacy programs worked with their accrediting agencies to develop acceptable alternative options. For example, the Pharmacy Council of Thailand allowed pharmacy students to use online learning instead of practicing onsite. This measure helped students to complete clerkships and graduate on time. However, most pharmacy experience clerkships including ambulatory care, acute care, and community pharmacy require patient-pharmacist contact and training on-site to successfully achieve the clerkship's learning objectives. Thus, most schools moved their clerkship learning experiences to later in the year.

Some schools, such as MSU, requested students to switch one clerkship to clinical research or drug information, instead of participating in rotations with direct patient contact from May to July 2020 as shown in Table 4. These clerkships could be completed remotely without patient contact. Project-based and case-based activities were mainly used during these rotations to mimic experiences in the hospital and allow students to have self-directed learning. Other schools such as TU and UPM provided clinical rotations for students to meet requirements of their boards of pharmacy. To set up this type of rotation, it was necessary to prepare good virtual cases and simulations. All these schools collaborated with their hospital partners to create simulated cases. Students were usually assigned into small groups of two to five people for the discussions. Students were assigned simulated cases and had to develop care plans for patients. Then the small groups discussed how to manage each patient. Other assignments included case presentations, journal clubs, drug information questions, and academic services. It should be noted that planning and implementing these remote activities did increase faculty workloads and could lead to faculty members becoming exhausted.

Success in managing online clinical clerkships requires good collaboration between pharmacy schools and practice sites to create the proper virtual simulated cases. Communications between teachers and students are also important to assure clear understanding of the learning process. Since online rotations usually require synchronous meetings, internet/device problems can create meeting challenges. Thus, it is important for both teachers and students to understand these issues and be flexible with scheduling and when problems occur.

Changes in Methods for Lab-Based Study

Various strategies were used to maintain effective laboratory practices during the COVID-19 pandemic. Due to short lockdowns during the first wave, UHS and HPMU continued to conduct all laboratory activities on-site. MSU, TU and SDU combined online and in-class teaching in accordance with strict hygiene protocols during the first and second waves of the pandemic. UPM decoupled laboratory courses from lecture classes and transferred laboratory activities to later in the curriculum when face-to-face classes could be resumed. At MSU and SDU, some laboratories experiences were changed into online simulations and discussions; only senior project/thesis research students were allowed in the laboratory with strict health protocols. At TU, all lab-based experiments for senior projects were switched to systematic review projects based on initial topics or were moved to a subsequent semester when access to campus facilities was allowed.

SDU developed a very creative way for students to practice pharmaceutical compounding. Instruments to mix medicine were sent to the students. Faculty members started the first meeting with the theory of drug compounding, including videos for students to view. In the second meeting, the students were given a prescription and asked to prepare the medicine according to the prescription. The students then videotaped the process of preparing the prescription. The videos were shared at the next meeting and discussed. Pharmacology laboratories were carried out in a similar manner.

Teaching Strategies to Maintain Active-Learning

Like other programs worldwide, pharmacy schools in ASEAN countries also focus on incorporating active-learning methods in the curriculum to improve student engagement, student motivation and student ability. These learning methods also help develop critical-thinking, problem-solving skills, and cognitive function, which are important for students when they work collaboratively with other healthcare providers. However, it is difficult for teachers to maintain active learning environments during remote teaching. Several teaching strategies have been implemented in ASEAN pharmacy schools as discussed below.

Case-based learning was utilized during remote teaching in many schools to improve student performance in clinical problem-solving, managing patients, decision-making, and therapeutic knowledge. During the lockdown, students received patient cases via LMS and applied their knowledge to suggest the appropriate drug therapy. For example, MSU set up a case-based activity for fifth-year pharmacy students with simulated cases including a set of questions uploaded to Microsoft Teams (Microsoft, 2021b) a week prior to a discussion session. Students submitted the answers for the case on Microsoft Teams (Microsoft, 2021b) and subsequent discussion sessions were held remotely with attendance required. During the live discussion, teachers engaged with students by asking questions and encouraged students to ask any questions they had. The polling and chat features available on Microsoft Teams (Microsoft, 2021b) were used to increase interactions.

Another good example is from TU. Pharmacy students were required to work on virtual case notes that simulate real patient case notes to meet the pharmacy practice experiential training requirements for graduation. Faculty members designed a standard case note format including admission clerk sheet, progress note, medication chart, observation chart, input-output chart, laboratory report, therapeutic drug monitoring forms, etc. Groups of 4-5 students carried out discussions, identified pharmaceutical care issues, developed pharmaceutical care plans, and made case presentations covering the chief complaint, history of presenting illness, significance of laboratory findings, proposed therapeutic interventions, and outcome monitoring. Students were then required to present their cases for assessment in their individual breakout rooms. After the case presentations, all students gathered in the main room for debriefing and a ‘close the loop’ group discussion session with the instructors. UPM and SDU also conducted similar case discussion sessions; SDU’s sessions were interprofessional involving pharmacy, nursing, and medical students.

These experiences demonstrate that case-based learning could be easily implemented during lockdown, allowing students to work at their own pace and helping them think clinically. The important step for this teaching method is developing appropriate simulated patient cases to assure that students will achieve class’s objectives. Similar processes have been used in the United States (Moreau et al., 2021) and in Australia and New Zealand (Lyons et al., 2020).

Many ASEAN schools used team-based activities during lockdown to allow students to learn from each other and develop team skills. This activity also provides an opportunity for students to get feedback from teachers and their peers. Current technology allows all students to work with others easily even if they are at home. Generally, students were divided into small groups and worked on a project or problem-based activity together. It is important to divide students into proper groups. If students self-select their groups, often smart students or weak students will team together. Therefore, several schools, such as MSU, selected student groups by using their grades, with each group having students with higher and lower GPAs.

During the pandemic, many pharmacy schools have employed PBL and debates. Previous work supports the idea of using online debates to improve critical thinking and communication skills (Lin & Crawford, 2007). Academic debate has been used at MSU since 2009 to help students gain knowledge of current pharmacy practice, drug formularies, the Thai health system, and other current issues. Moreover, debate allows pharmacy students to improve their literature searches and develop decision-making on controversial topics using current evidence-based methods. Students were divided into groups of 9-10 people and were assigned different debate topics at the beginning of the semester. Students had two months to prepare for the debate presentations. Fortunately, MSU students were able to return to campus before the actual debate presentations, so faculty members could assess the students' performance in person. This teaching method encourages students to work on a project together at their own pace, so limited internet access is less problematic.

Communication between Students and Faculty Members

COVID-19 changed communication patterns between students and faculty members in many ways. The various ASEAN schools of pharmacy employed a variety of means for communication including telephone calls and messaging, email, WhatsApp (2021), Facebook (2021a; 2021b) (including Facebook Messenger), Zalo (n.d.), and various online platforms such as Canvas (2021), Google Classroom (Google, n.d.a) and Microsoft Teams (Microsoft, 2021b). Online educational platforms were a mainstream channel to manage ERT as they provide not only a space for online teaching, but also allow group and individual communication, and assignment and quiz distribution.

To overcome limited internet access in some areas, UPM partnered with SMART Communications, a leading telecommunication company in the Philippines, to provide free announcements through text messages or INFOCAST. INFOCAST is a web-based solution that offers various functions and capabilities. Students were able to receive announcements, surveys, and quick polls, and reply through SMS (short messaging system) or text message using their mobile phones. Faculty members as well as the Student Council used this free broadcast (as shown in Figure 1).

There are potential limitations to the implementation of online platforms. While online platforms allow prompt communication so that people can communicate anytime, they sometimes lead to miscommunication and over communication (such as midnight messages). Additionally, speedy communication via online platforms may drive students to expect instant replies from classmates and faculty members. During the pandemic, teachers were more open to giving their contact numbers to students lacking internet access. Although communication is essential in remote teaching, boundaries need to be set to avoid students messaging professors at inappropriate times (e.g., midnight) and expecting a prompt response. It is important to establish rules to protect boundaries of personal and family time as education and work will likely continue to be done remotely.

Academic Assessment During the Pandemic

ASEAN schools were not prepared for conducting examinations remotely at the start of the pandemic. It was a big challenge for academic staff to remotely assess students both fairly and accurately. There were a variety of strategies used among the six universities. Some schools such as MSU and UPM could not set up proper online examinations within a short period of time and the best solution was to postpone exams until later. Laboratory and practical examinations (such as OSCEs) were cancelled or postponed because they require the use of devices and tools provided by schools. Not only were school examinations postponed and cancelled, but the national pharmacy licensing examinations also were postponed in many countries including Thailand and Philippines; the exam system security features for online examination were not ready for the large group of graduates.

Most schools in ASEAN do not have an online proctoring system, so some schools utilized free online platforms such as Google Forms (Google, n.d.b) and Microsoft Forms (Microsoft, 2021a) to create exams and sent students links to access the exams. The advantages of these platforms are that they are free of charge, easy to use, and familiar. However, they may not be suitable for summative examinations, where exam integrity is a concern, because these programs do not come with cameras or systems that allow proctors to monitor students remotely and they do not lock down student devices to prevent access to other applications. Some schools use video conference platforms such as Zoom (2021), Microsoft Teams (Microsoft, 2021b), and Google Meet (Google, n.d.c) for online proctoring, allowing proctors to monitor students during online exams. However, two devices are required: one device for administering the exam and a second device with a camera to allow proctors to monitor activity of students. With this method, many proctors are needed if an exam is simultaneously administered in a typical size class. TU is the only university having a system designed for online proctoring.

ASEAN pharmacy schools used other adaptations to facilitate assessment of students during periods of remote learning to avoid the need for proctoring. For example, MSU used the same multiple-choice questions for all students, but randomized the order of questions on individual exams. MSU also limited the time period in which students could take an examination, thus requiring all students to focus on their tests rather than interacting with peers. Some schools used open book written examinations where the focus was on critical thinking, analysis, and data interpretation, rather than recalling facts. For small classes, oral exams were sometimes used with questions that had previously been intended for written examinations. Some schools substituted other forms of assessment, such as projects requiring students to create their own original work, instead of examinations. UHS and HPMU had short closures and were able to promptly reopen their campuses, thus avoiding the need for remote examinations.

Difficulties in Remote Teaching and Evaluation

In online classrooms, it is more difficult to get feedback from students since they cannot be observed as in a normal classroom. Faculty members of MSU reported difficulty with student engagement during online lectures/activities. This was also a problem for synchronous sessions in UPM, since most students had to turn off their cameras to save internet data or if their internet connection was unstable. Faculty members therefore could not observe if the students were listening, and it is difficult to teach without seeing students' faces. Faculty members also needed to manage the slides being presented, monitor the chat box for questions, or see if there were raised hands.

Struggles in online learning include the cost of devices such as smartphones, tablets, or laptops, which add additional educational expenses. Some students in Thailand were unable to afford these devices or the cost of home high-speed internet. Students at UPM who did not have working devices were given laptops provided through a fund-raising campaign of the UP Pharmacy Alumni Association or were loaned tablets by the college. Some telecommunications companies offered free SIM cards or free mobile Wi-Fi to students.

Unstable internet connections pose problems since some parts of Asia are mountainous and rural areas, with very poor signals. In some towns, students only have strong internet connections at night and have difficulty participating in synchronous sessions. Turning off cameras can reduce required bandwidth by 80% but creates aforementioned problems. The cost of internet service was particularly a problem among UPM and SDU students.

High electricity costs as well as loss of electricity are problems among students across ASEAN countries. Loss of electricity due to system maintenance or calamities, such as strong typhoons, earthquakes, flooding, landslides, and even damage to houses of some faculty members and students, greatly affected remote learning and teaching in 2020. In some affected areas, restoration of electricity and internet took almost a month, so students were given extra time to complete lessons and requirements.

There were many challenges for online examinations. Technical problems could occur unexpectedly and were sometimes unpreventable, requiring a spontaneous response from teachers or students. Some students could not submit their exam files and others encountered problems with laptops or other devices used during an exam, sometimes due to electricity failures. Breaking the exam into several parts is helpful for students, because they can submit each small part of the exam within a shorter period with less risk of losing the full exam results. Many students had devices that were insufficient for examinations, such as smartphones, with batteries requiring frequent recharging. And, as previously discussed, maintaining exam integrity was a major concern with some students making extremely high scores.

Many faculty members experienced difficulties teaching in the remote environment. At HPMU some faculty members were not prepared for online teaching and learning. The pandemic 'pushed' them to effectively use technology and they are becoming more comfortable in its use. Faculty members at other ASEAN schools experienced similar challenges. The various universities offered different types of training to help faculty successfully teach in virtual environments.

It is evident that ASEAN universities clearly experienced struggles with remote teaching and examination due to digital divides and other factors. The resilience and passion of faculty members to continue their teaching and for the students to pursue their studies, despite these difficulties, is an inspiring story amidst this crisis. The spirit of compassion, consideration, and kindness of both students and faculty members, while upholding honor and academic excellence in ASEAN universities, is a commendable feat. This pandemic has pushed university staff to go past personal limits to adapt to the use of technology to produce future pharmacists who will greatly contribute to drug discovery, vaccine development, drug manufacturing and dispensing, pharmacovigilance, patient medication management, and immunization of patients, because the world will always need pharmacists just like the ones who are currently contributing to the fight against COVID-19.

Mental Health of Students and Faculty Members during COVID-19

Some students and faculty members had mental health problems due to stress, including anxiety and depression. Because of the high level of stress among faculty members, UPM scheduled a psychosocial care program to aid faculty members experiencing stress due to the pandemic and workload. Additionally, some students also complained that they did not have personal study space at home, had noisy home environments, and were bothered by family members. This scenario was observed in Thailand and the Philippines, with staff recommending students create a personal study schedule to be given to their family.

Various factors contributed to increased student stress and anxiety. When SDU began remote learning, faculty members often gave additional assignments because they were not sure about the level of student understanding of the material. After an evaluation of online learning was held, the lecturers began to reduce assignments and focus teaching more on understanding. TU's students reported feelings of anxiousness due to not being able to connect with their classmates, having limited private space to study at home, and dealing with unstable internet connections while sharing internet bandwidth with family members who were also studying or working from home. It is therefore crucial for educators to be sensitive to these factors and be flexible in accommodating student needs (Brown et al, 2015). After attending online learning for some time, students reported enjoying the flexible study hours offered by pre-recorded lectures, being able to learn from the comfort of their home, and time saved from commuting.

As mentioned earlier, online exams can cause excessive stress for students due to slow or unreliable internet connection resulting in student fear of being unable to submit exams on time (Elsalem et al., 2020). Some students voiced concerns about unfairness as they noticed suspicious activities among their classmates. ASEAN pharmacy schools employed various means to prevent cheating using Canvas (2021) and Zoom (2021), with UPM later employing lockdown browsers and Respondus (2021) monitoring. Some students voiced privacy concerns from various forms of proctoring and concern about spyware or malware infecting their devices.

Students at the various ASEAN universities also experienced anxiety related to possible delays in graduation and in licensing. While the schools were able to adjust schedules to prevent delays in graduation, changes in scheduling resulted in UHS delaying graduation two months and HPMU delayed graduation for one month as shown in Table 4. Some nations delayed their pharmacist licensure exams. Thailand made the decision to provide one-year pharmacist licensure to all 2020 graduates and require them to take the Pharmacist Licensure Examination in 2021. TU's students completed their Professional Qualifying Examinations after the exam was postponed twice. SDU graduates successfully completed their licensure examinations, but their Indonesian licensure as a pharmacist was delayed for 3 months because the pharmacist's asseveration ceremony was postponed due to a health protocol requiring physical distancing.

To support mental health among students during the pandemic, some universities provided various services for their students including special counseling centers. At MSU, both online and face-to-face counseling were provided by a psychologist to ensure students' wellbeing. HPMU provided a health station with specialists in mental health to assist faculty members and, especially, students. UPM scheduled reading breaks during the semester to allow students and faculty members time to rest and breathe. While there were some 'signals' that the pandemic affected students mentally, there is not available data to quantify mental health impact during the times that universities were locked down and students away from campuses. For example, HPMU students lived in different regions and in different accommodations during online teaching, making it difficult to track their health and wellbeing.

Educational Products and Outcomes

Programmatic Changes

This pandemic created a problem-based learning situation for faculty and staff as they adjusted to unfamiliar platforms with initiatives for making students active in learning. Studies suggest that educators play important roles in ongoing engagement with students, shaping the digital culture, creating a sense of belonging, and motivating students to become effective online learners (Brown et al., 2015). Moreover, the pandemic provided an opportunity for faculty members to conduct in-class research and innovation. For example, MSU has developed a strategic plan for research in educational innovation to improve learning experiences for students.

The conversion to remote instruction and working from home immediately changed the methods of teaching and learning, as well as lifestyles. Young faculty members in each ASEAN university were comfortable implementing online platforms while older faculty members were more fearful and resistant, and voiced valid concerns that activities in labs, hospitals and pharmacies could not be replaced by remote learning. Knowledge sharing between faculty members resulted in faculty learning new skills, including the preparation of quality online lectures. The COVID-19 pandemic has provided more opportunities in some countries, such as Thailand. At MSU, online courses have been fully developed and approved in graduate programs; thus, this change made the Master of Pharmacy program more attractive to pharmacists in Thailand and resulted in recruitment of additional students. Other universities have changed curricula, teaching methods, and strategic plans for education development. TU used mixed methods teaching to provide a program for international students who could not return to Malaysia during the COVID-19 pandemic. Streaming during in-class teaching opened an opportunity for them to study while remaining in their home country.

Measures needed to be taken to assure student competency during the pandemic. With help and support provided by schools, grading systems became more flexible and compassionate. Faculty members reported that some students were motivated by online learning. They enjoyed learning new platforms, the flexible study hours offered by pre-recorded lectures, the ability of being able to learn from the comfort of their home, and time saved from commuting that improved their productivity as reflected by their improved coursework performance as compared to pre-COVID era. However, some students missed the ambiance of friends in the classroom and still preferred to study onsite.

Changes in the mode of instructional delivery presented unique challenges for ASEAN universities in managing student behavior and monitoring student progress within an entirely new e-learning environment. Difficulties during the pandemic occurred in adjusting course design and/or teaching methods to maintain the semester schedule to prevent or minimize delays in graduation. Systemic and individual approaches were used in adjusting course modules. Some examinations were changed to be assignments. Faculty members used engagement techniques while teaching online. This was done by sharing among faculty members and learning from experienced teachers. Assignment overload, with students requesting reductions, was found in a study of Indonesian pharmacy students (Syofyan et al., 2020).

Effective management was helpful for keeping students on track to achieve learning objectives and graduate on time. It was more difficult to manage labs, research, and experiential placements. The clerkships in hospitals, community pharmacies, food and drug sectors, and other sites were adjusted and developed in various ways using simulation cases from preceptors (TU, UPM), case reports from previous years (MSU), experience sharing by alumni preceptors (SDU, UPM), and small group discussions (UPM, MSU). General communication between faculty members and students before the pandemic was done by official emails or students walking in to arrange meetings with faculty members. During and after COVID-19, more channels were used for enhancing communication between faculty members and students including LMS, Facebook Messenger (Facebook, 2021b), or other applications such as Line (n.d.) and WhatsApp (2021). Concerns have been expressed about student manners, proper communication times, and patience in waiting for a response from faculty members.

System Technology and Infrastructure

The pandemic required ASEAN universities to make additional investments in infrastructure to facilitate online teaching. Each university and school adjusted differently based on facilities and available funds.

Some universities with national or international rankings, such as TU, UPM, and MSU, viewed technology expansion as a means to enhance their rankings. Additional training was also necessary to prepare faculty and staff members to use the newly acquired resources.

Various examples of technology and infrastructure enhancements include improved internet service and WiFi (SDU, UPM, HPMU), meeting rooms with infrastructure for online meetings (UHS), private rooms that are equipped for online teaching (MSU), an interactive learning center (UPM), and additional LMS (MSU). These various facilities often required equipment such as televisions, cameras, microphones, computers, spotlights, and headphones. TU, a private school which provides courses for international students and has five years' experience in distance learning, had little difficulty in adding infrastructure.

Cost Impacts

Although it was difficult to adjust at first, most countries promptly learned to adapt and experienced cost savings for travel, rental accommodations, and commuting expenses. For example, SDU is in the city of Yogyakarta, Indonesia. Yogyakarta is known as the city of students, with most students coming from other provinces. Students usually rent rooms or houses in Yogyakarta, but the COVID-19 pandemic caused most students to return to their hometowns. This reduced their costs, though most students still paid rent because they left their equipment where they were previously staying. HPMU's students experienced a similar situation. UPM provided teachers an internet allowance for their online classes. Even with this assistance, the university has saved on electricity expenses due to lower use of laboratory equipment and air conditioning. The university saved on water expenses, as well as reagents since laboratory classes were not conducted during the pandemic. For faculty members, savings in time and transportation costs were achieved. In contrast, faculty and students experienced increased home electricity expenses for internet, air conditioning, and charging of devices. In addition, many faculty members and students spent additional money to purchase IT devices to support remote teaching and learning. Annual exchange programs for students and staff were postponed or changed to be virtual meetings during the COVID-19 pandemic, saving budgeted travel expenses.

Opportunities for National and International Collaborations

Academic Meetings Online

Various academic conferences are traditionally held yearly in most schools of pharmacy in ASEAN countries. With travel restrictions, conversion to online meetings was the best choice. For example, MSU's first academic fully online meeting was on the topic "Advances in Herbs and Thai Traditional Medicine, No. 2" (P. S. Olson, personal communication, June 30, 2021) using Cisco Webex (Cisco, 2021). Since the second wave of COVID-19 would have resulted in few in-person attendees, MSU decided to switch to a fully online conference one month before the meeting. Without any knowledge about online meetings, MSU set up the conference with assistance from its computer center using the previously procured Cisco Webex (Cisco, 2021) platform. This conference had 140 virtual attendees. Changing from face-to-face interactions to virtual meetings can increase the number of participants and result in cost savings for travel and accommodations. Other schools of pharmacy conducted similar online conferences.

Online Educational Activities

During the pandemic, all international exchange programs were postponed. To maintain collaboration among partners, activities for students were conducted using online platforms. MSU successfully conducted an online joint seminar with nearly 50 participants connected. Although there were some difficulties with connections, it was managed without major problems. UPM was also able to invite alumni and experts from other countries to talk to students in different courses during the pandemic. Online activities for graduate students were also carried out using online platforms. A webinar on "How to Publish Master/PhD Theses in International Journal" (Thomas, 2020) was held to support graduate students. There were 28 graduate students and faculty from MSU and four people from other universities who participated, including students from Lao PDR.

Online English-learning with foreigners was also conducted in a module, allowing MSU pharmacy students to practice conversation with foreigners during COVID-19. The course director of international relations recruited 18 volunteers using small groups via Google Meet (Google, n.d.c). The 102 pharmacy students in the fifth year were assigned to small groups of six people. Two narrative stories were selected from the Bible. The practice time was one-hour on two days in July 2020. Meetings were held to share lessons learned by the pharmacy student group and the volunteer group. Students liked the experience with foreigners and felt active. Participating in small groups helps them to become confident. Challenges included unstable internet connections, difficult vocabularies, and no participation from some students. Sometimes they answered questions incorrectly, but it was fun.

Online student cultural and academic exchange programs were conducted by UHS with the Faculty of Pharmacy, Silapakorn University, Thailand. TU, SDU, and UPM have suspended the student exchange programs since their partner universities are not accepting international students. However, the UPM Office of International Linkages is now developing an online exchange program that will be implemented in the next semester with partner universities.

Collaborative Research

Multilateral research collaboration is generally based on mobility of faculty and students, with communication and preparation for research collaboration commonly using e-mail as a tool. Lack of prompt responses and one-way communication may delay research activity. During the pandemic, faculty and student mobility was limited and interactions became virtual. Several training courses were implemented to improve the digital readiness and online skills of faculty to facilitate academic interactions. Besides teaching, virtual meetings as well as conferences were accelerated during the pandemic. ASEAN collaborators also conducted a study entitled "Readiness in Pharmacy Students' Preparation to Provide Pharmaceutical Care for NCD Patients in ASEAN Countries: a Qualitative Study" (P. S. Olson, personal communication, July 1, 2021). This research was planned before the outbreak using e-mail. After the research proposal was approved, all activity shifted to online. With digital training during COVID-19, all investigators had comprehensive skills for online meetings. This book chapter is a result of collaborative work among this same partnership of six ASEAN universities and Auburn University.

Webinars

Several webinars were held by different ASEAN partners. For instance, MSU presented "Facing the Future: Pharmacy Teaching and Practice during COVID-19" (Jungnickel et al., 2020). This Webinar was a big success with 52 people registered from six countries; and 23 Thai pharmacists received CPE credit. This helped grow relationships between the participating universities. Other ASEAN universities organized or joined webinars with partners such as the meeting of HPMU with the International Pharmacy Federation on "Addressing Inequities in Pharmacy Education due to COVID-19-Learnings from Africa, Asia & Latin America" (International Pharmaceutical Federation, 2020) and TU partnering with Griffith University on "Safety First: Using Your Medicines Right'' (B. K. Tam, personal communication, June 30, 2021). The opportunities to attend webinars were also opened to other ASEAN partners. These were great experiences for partners around the world to learn from each other and foster in pharmacy practice and education.

Lessons Learned: Stories from Each Country

The COVID-19 pandemic required each of the universities to make significant and prompt adjustments to many facets of their programs and operations, and each learned lessons that they will use as they move forward into the future.

Mahasarakham University, Thailand: Horizontal and Vertical Integration of Knowledge

Courses for pharmacy students combining both horizontal and vertical integration were remotely implemented at MSU to reduce the compartmentalization of knowledge. PBL assignments integrating knowledge across clinical and basic sciences were provided to students at the beginning of the semester. Integrating the contents and learning objectives allows various subjects to be addressed simultaneously through one assignment, resulting in fewer assignments for students. This project-based assignment, incorporating debate, allows students to become self-directed learners. They can learn at their own pace without the concern of limited internet access. This integration concept has been continually developed since first published by Sookaneknun et al. (2009). It helps students to apply up-to-date and seamless knowledge between current modules, and prior knowledge studied in previous years, into real practice. Microsoft Teams (Microsoft, 2021b) was used to maintain these activities during the COVID-19 pandemic.

The PBL cases were simulated by a collaboration of faculty members from three academic groups. The simulation integrated knowledge from modules in the fifth year with prior basic science content to include various perspectives: Could you buy the medicine in a community? How to check local products approved by FDA Thailand. How could you formulate unavailable medicines for hospital patients using pharmaceutics knowledge? How do you deal with switching therapy for a HIV patient when medications are scarce? How do you identify, resolve, and prevent drug related problems, focusing on adverse drug events? How do you ask questions to patients who are foreigners? How do you refer a patient from a community pharmacy to a hospital? Answering these types of questions requires students to utilize knowledge from various pharmaceutical disciplines to provide solutions to common problems encountered when providing patient care.

Taylor's University, Malaysia: Online Closed-Book Examinations Facilitated by Safe Exam Browsers and Synchronous Invigilation

As pharmacy is arguably a rather fact-based profession, there is a need to ensure the program produces graduates who are equipped with subject-specific knowledge. Therefore, the academic program committee at TU determined that examinations would still be the most objective method to assess students' competency in aligning with our program's learning outcomes. This decision was made even though most faculties in other disciples of study, such as business and engineering, had replaced examinations with alternative assessments. The School of Pharmacy in TU adopted time-limited closed-book examinations, in which the greatest challenge was to ensure academic integrity.

We utilized the quiz function in TIMeS (Taylor's University, 2021), TU's e-learning portal; students received examination instructions and other announcements from the module leaders prior to examinations. Several procedures were used to address the concerns about academic integrity. The examination files set-up on TIMeS (Taylor's University, 2021) were integrated with a safe exam browser (SEB). Examination files were configured in such a way that students would only be able to attempt the examination if they were using the SEB. Once students logged in to the SEB mode, accessing any other applications such as pdf or PowerPoint on their laptop or device would be disabled. Switching to other user accounts on the computer was also disabled by the SEB until the student submitted the examination. During the examination, invigilation was conducted through Zoom (2021), with each student logging into Zoom (2021) from their smartphone. At the start of the examination, invigilators would check to ensure that students' surroundings were clear of any notes, materials, or other devices. The invigilator would also ensure that each student's webcam was placed at an appropriate angle for remote proctoring, with the student, his/her computer screen, and the surroundings all clearly visible. At the end of the examination, students either submitted their answers directly online or scanned handwritten answers (therapeutic drug monitoring calculations or drawing of medicine chemical structures) using a handphone with submission via the e-learning portal.

TU's policy is to ensure all students were given the opportunity to try any unfamiliar assessment method, without grading. Hence, a mock examination was conducted to walk students through the entire process and troubleshoot any technical problems, which was critical to enable successful completion of examinations and avoid adding to the stress level of students. Formats of examinations were adjusted to reflect the challenges that may be encountered through online assessment. The examinations were timed and conducted in sections, with 10-minute breaks between each section. Reducing the number of questions allowed students to go for washroom breaks while staying virtually within the view for invigilation throughout the examination periods. Students who were suspected of misconduct, such as talking to someone while having their microphone muted, were instructed to leave their breakout room, and join the main room for the chief invigilator to deal with the issues. Like the proctoring model in the United States as described by Draugalis et al. (2020), the entire examination process was recorded for review in the event of suspected academic misconduct.

Post final examination, TU recognized that the academic performance of students undertaking online final examinations or alternative assessments under a relatively unfamiliar learning context may be unfavorably judged. The Malaysian Qualifications Agency and the Pharmacy Board of Malaysia had approved an alternative grading scheme proposed by TU. Under this new grading scheme, students were offered the option of choosing a pass grade to replace a usual grade for a maximum of three modules taken per semester; therefore, these grades will not contribute to students' semester grade point averages and overall cumulative grade point average.

University of Philippines Manila: A Spirit of Civic Unity

The spirit of 'Bayanihan', meaning a spirit of civic unity and cooperation among Filipinos, was also observed at UPM as alumni, other donors, and student organizations continuously volunteered, organized, and donated to fund drives to help students in need of financial and device assistance. Food assistance was provided to the security and administrative aides who were stranded and lived at the university during the lockdown. Classrooms in the college and university were made into temporary housing for nurses, doctors, and other healthcare workers of the Philippines General Hospital (PGH) who were stranded due to lack of transportation during the first few months of lockdown. The College was also able to donate personal protective equipment to the PGH Pharmacy Department as well as gallons of alcohol for the PGH frontliners.

The UPM College of Pharmacy was also able to implement TELEPHARMACY Services during the pandemic, where volunteer faculty members and alumni answered questions of Filipino people through the Colleges' official website, email, and social media account concerning diseases, medications, supplements, and other drug-related inquiries. This was linked to the UP-PGH Bayanihan Center where people can ask questions about COVID-19 and other diseases to doctors, pharmacists, and other health professionals who voluntee to answer calls in the PGH operations center. These services are free as part of the civic duty of the university to serve the Filipino people and country.

Hai Phong University of Medicine and Pharmacy, Vietnam: Evolution of Teaching Methods—Combined Online and Face-to-Face Classrooms

Online teaching/learning is becoming officially recognized by the Ministry of Education and Training of Vietnam (MOET), and can partially replace onsite teaching. The MOET also encourages universities to network/cooperate with foreign universities using online teaching/learning. Prior the pandemic MOET had recommended three ways to conduct online teaching/learning:

1. Online teaching/learning is a supporting method for onsite teaching, and faculty members can teach and give homework for students and guide them to use online learning sessions.
2. Online teaching/learning partially replaces onsite teaching, increasing time for students to study at home.
3. Online teaching/learning replaces onsite teaching when students cannot physically attend school.

HPMU had to apply the third solution in April 2020 when all students had to stay home, and used online teaching/learning to replace all onsite lessons. After May 2020, combined online and face-to-face teaching and learning (blended learning) were used and became 'normal' in the university during social distancing.

One of the interesting lessons from this is that students are very smart and learned very quickly how to join classes with Zoom (2021) or other platforms. Sometimes faculty members were not ready and needed technical support. We are fortunate that internet access is freely available in Vietnam and most students have smartphones. However, online courses affect foreign students (from Lao PDR) more seriously. Their Vietnamese language proficiency is not sufficient for them to understand lectures. HPMU was fortunate to lockdown only one time, in April 2020. After that time, HPMU combined online and face-to-face instruction and operated normally starting in July.

University of Health Sciences, LAO PDR: Additional Support for Remote Learning

UHS had never prepared for this situation and did not have facilities for online or remote teaching. Most teachers did not know how to conduct online teaching before the pandemic. However, when the pandemic came, the leaders of our faculty (vice president who was responsible for the Faculty of Pharmacy and the dean of the faculty) organized a free online program training provided by faculty members who had previous experiences in an online learning program. Some of the faculty members could use that online program for teaching during the pandemic, but others could not adjust to the online program and just delayed their courses. Fortunately, the university only closed for two months and then returned to normal in-class teaching. This pandemic situation taught faculty members a lot, and they can now promptly change to online teaching if necessary. Though it was not successful for 100% of faculty members, some could learn and adapt to the new methods. UHS is now ready to better support remote learning and has acquired some equipment such as televisions, cameras, and audio devices and plans to purchase additional equipment for all the faculties in the university.

Sanata Dharma University, Indonesia: Assisting Students and Communities

As an educational institution, SDU's biggest challenge was how to optimally assist students to study well during the impact of COVID-19. Interestingly, not everything caused by the pandemic is negative. The social life that cannot be learned in college theory can be realized during this pandemic. The pharmacy community at SDU, which consists of faculty and staff members, alumni, and students conducted voluntary activities to alleviate the impact of COVID-19 even in situations that increased their risk of contracting the virus. This included manufacturing hand sanitizer and distributing it to places where it was needed. Faculty members and students also delivered multivitamin packages and information flyers about COVID-19 to the public. Educational activities for the community were provided through the website by alumni. Faculty members provided online seminars that anyone could access. These seminars covered economics, learning methods, mentoring of young people, and mental resilience, all of which have changed during this pandemic.

Many students had difficulty continuing their learning activities because of the negative impact on the economic sector and limited online access. These impediments motivated SDU's pharmacy students who entered the university before the COVID-19 pandemic to persevere and continue their studies. Some openly asked for tuition waivers, while others persisted in obtaining internet access for learning.

Before the COVID-19 pandemic, Indonesians paid little attention to hygiene. There was a misperception where many Indonesian citizens felt that COVID-19 would not impact Indonesia because Indonesians were already immune. The existence of a pandemic created new and better habits. The community learned that hygiene is essential, namely improving the practices of washing hands, wearing masks, and paying attention to cough etiquette.

Key Factors that Helped during COVID-19

Leadership

Leadership became a strong key factor for managing the COVID-19 pandemic, including administrative teams, faculty, staff, and students, both at the university and faculty levels. Strong leadership helped faculty, staff, and students to understand COVID-19 situations, protected public health through implementing policies, and provided support including facilities, personnel, and budget. The schools of pharmacy provided effective help to people in communities during the pandemic. Examples include alcohol sanitizer production, university hospital services, and support for governments in distributing masks and alcohol to hospitals and communities.

Engagement

The COVID-19 pandemic forced faculty members and students in ASEAN countries to engage and collaborate to continue teaching and learning. Partnerships led to successful experiential changes and placements, and alumni showed a lot of support to students. This might be different in other universities in other regions, but the culture of ASEAN people encourages engagement to help each other as a family.

Attitude

Attitudes of students and staff are key success factors for adjusting during a pandemic. Excitement and collaboration using a LMS contribute to engagement, learning, evaluation, and improvement. Most ASEAN universities are in the learning and evaluating processes of using LMS. Many channels have been created and used to communicate between faculty members and students, and among groups of faculty members or students. This allows individual students to share their concerns and struggles. Sometimes, students did not communicate directly with university leaders but rather posted on their wall on Facebook or on Twitter.

Deployment

According to the culture in ASEAN countries, implementation of policies during the pandemic was done well, including prompt lockdowns and working with local authorities. Universities deployed policies during the pandemic through university committees, deans, heads of departments/groups, and student affairs administrators. Deans and administrative teams still worked in offices with social distancing during work from home periods to take care of any contacts that came to the schools. An example of the organizational structure of MSU for deployment of policies is shown in Figure 2. Evaluations to deal with challenges were done through online or onsite meetings. Concerns included teaching efficiency, evaluation methods, the effectiveness of live feeds due to disparity of internet connections in different regions, and venues and timing for requisite student field work. It was also necessary to prepare for increased online teaching and to set standard methodologies.

FUTURE RESEARCH DIRECTIONS

The COVID-19 pandemic is forcing ASEAN universities to redefine their roles and the value of education they are providing to their students and society. This situation is guiding universities of the future concerning how they can adjust given the world's increasing educational mobility. The current pharmacy programs among ASEAN universities vary in length (four to six years) and requirements for practice experiences (from two weeks to 2000 hours). Systematic approaches for education management will be useful to ASEAN pharmacy programs as they use lessons learned from the COVID-19 pandemic and make future adjustments.

During the pandemic, ASEAN universities have provided flexible learning experiences using LMS to post teaching materials and used on-demand video available 24 hours. Students with internet connection struggles, no electricity, or other disasters were able to study in multiple modes, including on-campus, blended, or totally online, depending on their needs and life situations. This flexibility allows students to create lifelong learning plans, such as TU is now developing for pharmacy students. Faculty roles will be changed to be facilitators of learning and students will have more control of their own learning.

In general, universities of the future will become places for people of all ages. Pharmacists will need to re-skill themselves and keep up with the pace of technological change. Thus, ASEAN universities must think more about having flexible curricula to suit various groups of students.

To effectively respond to the pandemic, ASEAN universities had to learn, analyze, and appraise how to make learning modules flexible and transform them into learning spaces available to students. This creates opportunities for schools of pharmacy to overhaul their curricula to be more flexible and enable each student to learn at a pace that best suits their abilities and engage with content in ways most beneficial to them. Some universities (TU, MSU) have transformed some curricula to be more flexible so they can reach out to national and international students. Some IT companies also used this opportunity to provide new platforms free or at low-cost to leading universities with plans for implementation throughout various countries. This opportunity also changed the usual norm of face-to-face meetings to combinations including both online streaming and onsite meetings.

ASEAN universities may need to learn from universities in the United States and Europe to expand online education to improve their standing on the global stage. Otherwise, students may take advantage of opportunities outside Southeast Asia. It is important that ASEAN universities educate students to be global citizens with global perspectives. This chapter shares a collaboration between six ASEAN universities and Auburn University related to lessons learned and struggles during the COVID-19 pandemic and their impact on transforming each institution for the future.

Educational changes during the COVID-19 pandemic may better prepare students to become lifelong learners and to learn from each other more effectively. The future roles of ASEAN pharmacists must continue to be reconsidered as societies continue to change.

As ASEAN universities use lessons learned from responding to the COVID-19 pandemic, and chart their future, they will need to carefully plan future changes and carefully evaluate the results. Well-designed educational research will be critical to assess the impacts of changes made. Important impacts for assessment include effectiveness of educational delivery, student engagement and professional development, expansion of access via distance education, costs of education, and enhancement of pharmacy practice.

CONCLUSION

Although pharmacy faculty globally adapted quickly to ensure the sustainability of pharmacy education, it is likely that they will continue to experience challenges for months to come given the uncertainty of the duration of the pandemic and when the universities and hospitals will be able to resume normal operations to fully accommodate students. Hence, education in the post-pandemic era may shift from the need for an expensive campus to quality learning supported by cutting edge technology. It is also possible that new education models with universities operated virtually for lectures, while having minimal in-person attendance for tutorials and practical education, will become a new norm. It is believed that these new education models would increase universities' capacities and lower program prices and, therefore, become a means to stay competitive in the higher education sector.

If pharmacy faculty members are looking at producing students who are resilient to the changing demands of industries and at how virtual technology may shape a new work nature (such as telepharmacy) for the profession in the post-pandemic era, then educators will need to continue to innovate their teaching practices to produce pharmacy graduates who are competent and relevant in their future workplaces.

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KEY TERMS AND DEFINITIONS

Association of Southeast Asian Nations (ASEAN): An economic union of 10 nations in Southeast Asia (Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam) to promote cooperation and mutual assistance between governments and facilitate development in areas such as economics, education, science, culture, and commerce.

Emergency Remote Teaching: A rapid transition to alternate educational delivery in response to an emergency or crisis that prevents teachers and learners from safely occupying the same physical space.

Invigilation: Observation of students during completion of examinations or other assignments to detect academic dishonesty when it is occurring.

Learning Management Systems: A software application that facilitates learning processes in courses or other learning environments; typical functions include sharing of documents, submission of assignments, examinations, and various forms of communication among faculty and students.

Movement Control Order: An order that specifically limits travel from one place to another; particularly applies to Malaysia.

Remote Learning: Courses and other educational activities occur outside traditional classroom and laboratory spaces with learners and teachers physically separated from each other; level of information technology used can vary widely.

Universal Health Coverage: All individuals in a nation or other geographic entity have access to essential health care services without suffering financial hardship.

APPENDIX

Table 1. Workforce, students, and curricula in six ASEAN universities

	Sanata Dharma University (SDU) Indonesia	**University of Philippines – Manila (UPM)**	**Taylor's University (TU) Malaysia**	**Mahasarakham University (MSU) Thailand**	**Hai Phong University of Medicine and Pharmacy (HPMU) Vietnam**	**University of Health Sciences (UHS) Lao PDR**
Students in the university	13,000	5,969	11,000	38,084	8,000	2,000
Number of campuses	1	17	1	2	1	1
Year of establishment of pharmacy program	1995	1908	2011	1999	HPMU 1979, pharmacy 2011	2004
Curricula (clinical practice experiences)	4–year program and (1-year professional degree)	5-year program (1200 hours required for practice experiences)	4-year program	6-year program (2,000 hours required for practice experiences)	5-year pharmacy program	5-year program
Pharmacy students (undergraduate/ graduate students)	750/160[a]	365/47	150	600/30	800/0	513/0
Faculty members/ supportive staff in pharmacy	22/31	26/14	16/0	51/30	28/13	48/0
National licensure examination	yes	yes	yes	yes	no	No
Type of the university: Public or Private	Private	Public (State University)	Private	Public	Public	Public

Table 2. Responses of universities to the COVID-19 pandemic in 2020-2021[a]

Year 2020	Jan-Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 2021	Feb 2021
Indonesia		First case Public health emergency Quarantines (vary)				WFH policy		Large-scale social restriction			Large-scale social restrictions		
Sanata Dharma University	2nd semester ERT Online midterm exam (option: but pharmacy did 100% online) April-June: all academic programs online No quarantine (rapid swab test at the airport/train—not for cars)					Re-open. Waivers, Lab onsite allowed for research	1st semester Online teaching 100% by using zoom 50% and the other 50% video on demand by YouTube (n.d.) and chat discussion with WhatsApp (2021) Lab onsite allowed October: positive COVID-19 cases reported around the campus					Break	Online teaching is likely until the middle of 2021
Philippines	First case Volcano eruption and earthquakes	First local transmission Enhanced Community Quarantine (ECQ) in Metro Manila and Luzon Lockdown & curfew		ECQ was eased to general community quarantine (GCQ) The government eased the lockdown till July 8 typhoons, landslides, flooding				Nationwide state of calamity GCQ until October October: shortened curfew hours November: strongest typhoon			GCQ Canceled resumption of in-person classes at the end of January January: home quarantine		
University of the Philippines, Manila	2nd Semester (January -May)	March: no face-to-face classes 2nd semester was halted. No grade of "4—taking an exam again" "5—failing grade", or incomplete for 2nd semester Transcript reported dropping courses due to COVID		A shift from traditional lecture to blended learning: VLE	No internship		Prepare courses	1st semester–manufacturing internship				Second semester moved to March 2021) Virtual Internship (January: hospital, February: community—zoom lectures, activities—no class)	
Malaysia		Movement control order (MCO)		Relaxed MCO (conditional MCO)	Recov-ery MCO		Pandemic public awareness	WFH order		WFH A state of emergency		Emergency ordinance by the King (January-August) MCO	
Taylor's University	Break	2nd semester: fully online teaching\ WFH			Re-open <30% WFH		1st semester: fully online-live streaming WFH					MCO Semester break WFH	

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Table 2. Continued

Year 2020	Jan-Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 2021	Feb 2021
Thailand	First case	First outbreak State of emergency: curfew till July 2020 Lock down policy during March 30 – April 30, 2020					State of emergency Quarantined				Second outbreak Colour-coding system[b] State of emergency: quarantines		
Mahasara-kham University	Committee of COVID-19 awareness Finished 2nd semester with completion of online final examination End of March: WFH		WFH	WFH ERT: 5th year PharmD students	WFH ERT: 5th year PharmD students	WFH ERT: 5th year PharmD students	1st semester: In-class teaching Clerkships for the 5th year students			2nd semester (November-April) In-class teaching December 15 graduation ceremony ERT started in Dec WFH			WFH ERT
Vietnam	First outbreak: 2 cases reported		Closed border (no new cases for 99 days)			Second outbreak	Limited traveling across the countries, closed some provinces.					Third outbreak Colour-coding system	Lockdown in some areas near Hai Phong and some specific areas in Hai Phong.
Hai Phong University of Medicine and Pharmacy	Most universities closed HPMU: Stopped sending students to placements, did not close the university at the beginning HPMU ran face-to-face classes in smaller groups, with sanitation, masks, distancing		HPMU closed ERT	2nd semester: in-class teaching Clerkships		No class during Summer	1st semester: in-class teaching					Extended longer holidays for lunar new year	ERT from last week of February, and ongoing online teaching
Lao PDR		First 2 cases, declaration of the government, 6 PM closure of border, lock down, state quarantined No more cases since April 12, 2020											
University of Health Sciences	1st semester	Closed the university (April-June 2nd) WFH, ERT			Re-open for starting 2nd semester (June-October) In-class teaching Clerkships for the 5th year students					1st semester: in-class teaching (November-February)			

[a]WFH = work from home, ERT = emergency remote teaching

[b]Colour-coding system -The red zone means maximum control and a high number of infections. The only province given this highest at-risk category was Samut Sakhon. The second-highest control zone (orange) covers those provinces surrounding Samut Sakhon -- Bangkok, Samut Songkhram, Ratchaburi and Nakhon Pathom. The high surveillance zone (yellow) comprises 25 provinces, while the surveillance zone (green) applies to provinces without infection

Table 3. Universities' support for information technology during the COVID-19 pandemic

	SDU Indonesia	UPM Philippines	TU Malaysia	MSU Thailand	HPUM Vietnam	UHS Laos
Extra budget (from university or faculty or donation)	Yes	Yes, extra budget for remote learning from university and from alumni donors	Yes	Yes	No	No
Support staff for IT/online (additional people/ resources during COVID-19)	Yes, from the university and faculty 3 staff from faculty and 3 from the university	Yes, there is an IT department for the whole UP System and a separate unit for UP Manila, the Information Management System (IMS) Department. There is also a separate team for Canvas management and UP Helpdesk to assist the students and faculty members. Each of the 3 departments in the college also has a representative on the college IT committee.	A team of staff overseeing IT related matters across the entire university	2 staff at the Faculty of Pharmacy, plus a training team from the MSU computer center	Yes, from the university	No
Extra activities to help during COVID (e.g., training)	Yes Training by the university and the faculty	Yes Series of online trainings from UP System and from UP Manila	Yes	Yes Trainings by the Faculty of Pharmacy and MSU	Yes Training and onsite support by IT staff	Yes Training by our own faculty members

Table 4. Rescheduled courses during the Covid-19 pandemic

		2020	Break	2020	Break	2021
SDU Indonesia	Semester	2nd week of February – 4th week of June	July	4th week of Aug – December 3	January	2nd week of February - June
	Years 1-4	Online: April – June	Opening onsite lab for research	Online teaching	Break	Online teaching
	Year 5	2.5-month of online class 7-month clerkships during COVID-19; 2 months in hospital, 2 months in the industry, 2 months in pharmacy (drug store), 2 weeks in primary healthcare, and 2 weeks in pharmaceutical distribution company 1) if students were able to contact placements by themselves, they could keep the clerkships; and 2) the school arranged webinars between students and alumni in the required areas of practice, especially those who could not find placements for clerkships.				
UP Manila Philippines	Semester	2nd: January - May	June - August (break)	1st: September - December	January - February	2nd: March -June
	Years 1-4	2nd Semester classes stopped in March, tried online but eventually semester ended in April due to struggles of online learning	Community, hospital, and manufacturing internship moved to December 2020 (manufacturing), January 2021 (community), February 2021 (hospital)	September - Start of remote learning for 1st Semester AY 2020-2021	Online internship with a community pharmacy	March 1, 2021 – start of 2nd Semester AY 2020-2021 April 29 – May 5 – reading/ wellness break June 11 – end of classes
	Year 5	2nd Semester classes stopped in March, tried online but eventually semester ended in April due to struggles of online learning	Graduation ceremony cancelled, students were allowed to pass the course	Online internship in manufacturing through college-initiated internship with invited preceptors from the industry	Online internship with hospital preceptors through Pharmacy Preceptors Guild of the Phils., Inc.	March 1, 2021 – start of 2nd Semester AY 2020-2021 April 29 – May 5 – reading/ wellness break June 11 – end of classes

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Table 4. Continued

<table>
<tr><th></th><th></th><th colspan="2">2020</th><th>Break</th><th>2020</th><th>Break</th><th>2021</th></tr>
<tr><td rowspan="4">TU Malaysia</td><td>Semester</td><td colspan="2">March 30 – August 5 (online)</td><td>August 7-23</td><td>August 24 – December 18</td><td>January 1 – March 28</td><td>March 29 – August</td></tr>
<tr><td>Years 1-3</td><td colspan="2">Start of semester delayed by 2 weeks</td><td>Semester break, reset examination</td><td>Online teaching, hospital attachment[a]</td><td>Replacement practical, internship in pharmaceutical company</td><td>Online teaching</td></tr>
<tr><td rowspan="2">Year 4</td><td colspan="2">Start of semester delayed by 2 weeks</td><td>Semester break, reset examination</td><td>Online teaching</td><td>Semester break</td><td>Online teaching, hospital attachment[a]</td></tr>
<tr><td colspan="6">Switched practice 8-week rotation to be online activities with simulated case discussion in June and October 2020. Graduation was on time in August 2020.</td></tr>
<tr><td rowspan="4">MSU Thailand</td><td>Semester</td><td colspan="2">2nd: November -April</td><td>April - May</td><td>1st: June - November</td><td rowspan="3">1-week break in November</td><td>2nd: November -April</td></tr>
<tr><td>Year 1-4</td><td colspan="2" rowspan="2">In-class ending with online examination</td><td></td><td>In-class teaching
Practice in year 3-4</td><td>Online and in-class (starting in March 2021)</td></tr>
<tr><td>Year 5</td><td>Teaching online for the 5th year students</td><td>Practice in placements for 10 weeks</td><td></td></tr>
<tr><td>Year 6</td><td colspan="2">3-week rotation and thesis</td><td>Elective 6-week clerkship (1 of 6): CRA[b] / drug information with preceptors</td><td colspan="3">6-week clerkships (remaining 5)</td></tr>
<tr><td rowspan="4">HPMU Vietnam</td><td>Semester</td><td colspan="2">2nd: January - June</td><td>Break in July</td><td>1st: August - December</td><td rowspan="4">3-week break in January</td><td>2nd: January –June</td></tr>
<tr><td>Years 1-2</td><td>In-class</td><td>Closed in April</td><td></td><td>In-class teaching</td><td rowspan="2">Online teaching</td></tr>
<tr><td>Years 3-4</td><td>In-class</td><td colspan="2">Delayed 1-month practice for a month</td><td>In-class teaching</td></tr>
<tr><td>Year 5</td><td>In-class</td><td colspan="3">Delayed one-month practice, and one month graduation later than the last year.</td><td></td></tr>
<tr><td rowspan="3">UHS Laos</td><td></td><td colspan="2">2nd: March - June
Changed to June -October</td><td>July - August (normal break)</td><td>1st: November -February (normal: October – January)</td><td>February</td><td>2nd: March – June</td></tr>
<tr><td>Years 1-4</td><td>Closed in April-May</td><td colspan="2">Delayed for 2 months to start 2nd semester</td><td>In-class teaching</td><td>Break</td><td>In-class teaching</td></tr>
<tr><td>Year 5</td><td>Closed</td><td colspan="3">Delayed the 7-months practice of year 5 for 2 months and delayed graduation for 2 months</td><td></td><td></td></tr>
</table>

[a]Hospital attachment in year 3 was adjusted to be 1-week for clinical experience and 1-week online activities including drug information simulation, TDM case study, and prescription screening workshop.

[b]CRA = Clinical Research Association

Figure 1. UPMPHARMA, the free broadcast for announcements to students

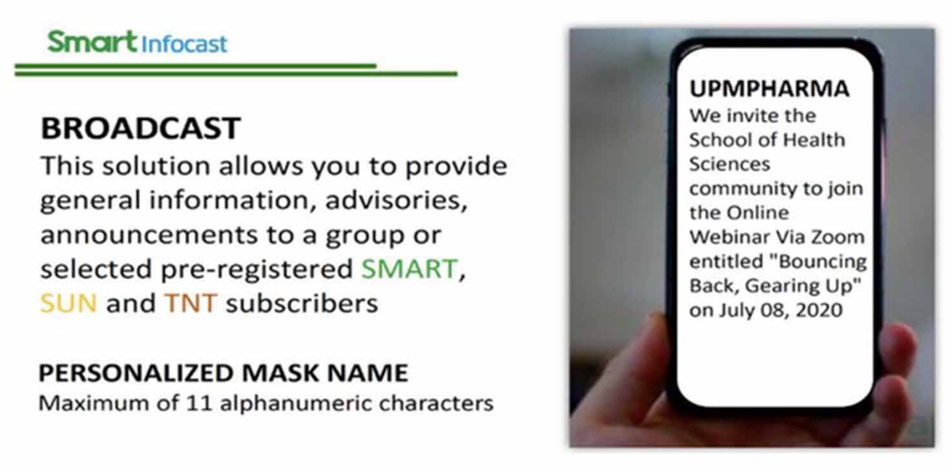
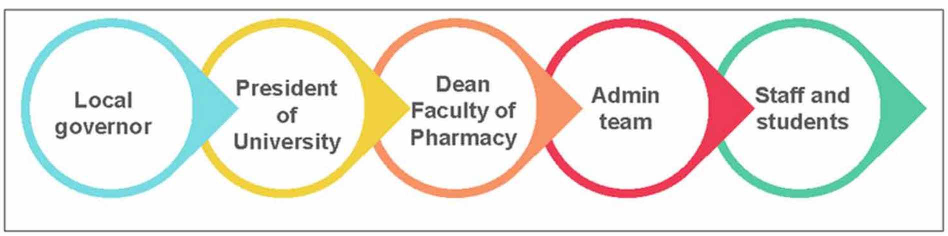


Figure 2. An example of organizational structure to deploy policies in MSU



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Cheryl D. Cropp, Pharm.D., Ph.D., is an Associate Professor at Samford University McWhorter School of Pharmacy. In addition to a Ph.D. in Pharmacogenomics, Dr. Cropp has several years of experience in academia and as a clinical pharmacist. Dr. Cropp has research expertise in finding functional genetic variants in healthy, diseased and health disparate world populations utilizing population and family data. Dr. Cropp is particularly interested in studies that enhance the understanding of the genetic determinants involved in the efficacy of pharmacotherapy of cancer. Dr. Cropp has ongoing research projects in the areas of genetic epidemiology, pharmacogenomics, and pharmacokinetics.

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Amy Curtis is an Assistant Clinical Professor at Auburn University School of Nursing. Dr. Curtis has over 17 years of combined experience in nursing and nursing education. She earned her BSN from Auburn University in 2003 and spent much of her nursing career working in orthopedics. She earned her MSN in 2011 from Auburn University and Auburn University Montgomery's Joint MSN Program. She also earned her College and University Teaching Graduate Certificate from Auburn University in 2011. Dr. Curtis earned her PhD in Adult Education from Auburn University in 2016. She is an Assistant Clinical Professor at Auburn University School of Nursing where she coordinates the Fundamentals of Nursing and Health Assessment courses for junior nursing students. She also teaches in both the MSN and RN to BSN Programs at Auburn University. Dr. Curtis is a Certified Healthcare Simulation Educator (CHSE) with over 9 years of simulation experience. Her research interests include best practice in simulation-based education, best practice in nursing education, gaming/innovative pedagogy, holistic admission practices, and breast cancer education. She is a member of the International Nursing Association for Clinical Simulation and Learning (INACSL), Simulation Society for Healthcare (SSH), Sigma, American Nurses Association (ANA), Alabama State Nurses Association (ASNA) District 5 where she currently serves as district Treasurer, American Cancer Society Action Network, and Auburn University Research Initiative for Cancer (AURIC).

Sudip Das has over thirty years of teaching and research experience in the professional pharmacy and graduate programs in the USA and Canada. He has supervised a number of postdoctoral, graduate and undergraduate research students, and was the key faculty responsible for the revitalization of the graduate program and research infrastructure in pharmaceutical sciences at Butler University. His current research involves targeted delivery of siRNA and nanocomposites for the treatment of glioblastoma and triple negative breast cancers. Dr. Das has over 150 research publications, review articles, patents, proceedings, conference presentations, and book chapters, is a recipient of multiple awards/honors, and has secured extramural research funding from NIH, PDA, and the pharmaceutical industry.

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Paul W. Jungnickel, Ph.D., R.Ph., Professor and Associate Dean for Academic Programs, was born in Forest Grove, Oregon. He received a Bachelor of Science Degree in Pharmacy from Oregon State University in 1972. In 1975, he completed a Residency and Master of Science Degree in Hospital Pharmacy from the University of Kansas. In 1993, Dr. Jungnickel completed a Doctor of Philosophy Degree in education from the University of Nebraska-Lincoln with emphasis in post-secondary administration. Dr. Jungnickel practiced hospital pharmacy in Portland, Oregon from 1975 to 1983, and then joined the faculty of the University of Nebraska Medical Center College of Pharmacy. There he practiced and taught in the areas of adult internal medicine and gastroenterology, and served as Coordinator of Experiential Education. He joined the faculty of the Harrison School of Pharmacy as Associate Dean and Associate Professor in 1997, and in 2002 was promoted to the rank of professor. He has published and presented extensively on the pharmacotherapy of dyslipidemia and gastrointestinal diseases, and also maintains a scholarly interest in the areas of educational reform in pharmacy and health care policy.

Erika L. Kleppinger, Pharm.D., BCPS, is an Associate Clinical Professor in the Department of Pharmacy Practice at Auburn University Harrison School of Pharmacy. Since joining the faculty 2003, she has practiced in several ambulatory care practice settings, coordinated and taught in a variety of skills laboratory activities, and worked passionately on curriculum development and revision. Dr. Kleppinger graduated from the Philadelphia College of Pharmacy in 2001 with a doctor of pharmacy degree. After graduation, she completed two years of post-graduate residency training – a Pharmacy Practice residency at Temple University Hospital and a Primary Care specialty residency at the Philadelphia College of Pharmacy in association with the Philadelphia VA Medical Center. In 2003, Dr. Kleppinger became a Board Certified Pharmacotherapy Specialist (BCPS) and from 2006-2016 she was a Certified Diabetes Educator (CDE). While previously practicing as a clinical pharmacist in ambulatory care practice, Dr. Kleppinger now dedicates most of her time to skills lab coordination and assessment with Objective Structured Clinical Exams (OSCEs) and other performance-based assessments. She teaches in many areas of the Practice-Ready Curriculum, including patient assessment skills, communication skills (specifically assessing patient understanding and new prescription counseling), the pharmacists' patient care process, self-care, dermatology, cough and cold management, and immunization certification training. She also serves as a Skills Coordinator and a Learning Community Chair for the first professional year of the PharmD program. Dr. Kleppinger's outreach efforts include coordinating the Resident Teaching and Learning Program (RTLP) offered by the Harrison School of Pharmacy to pharmacy residents across three states, mentoring pharmacy residents in various teaching activities, and assisting with the creation and implementation of a summer Pharmacy Camp for high school students. Her scholarly work focuses on the scholarship of teaching and learning with an emphasis on skills-based education and performance-based assessments.

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Kelly Lempicki is the Assistant Director of the Clinical Skills and Simulation Center at Midwestern University and an Associate Professor of Pharmacy Practice. She graduated from Butler University College of Pharmacy and Health Sciences and completed a PGY1 residency at Midwestern University. In her current position, Kelly supports the development and implementation of simulation experiences for pharmacy and other health profession students using a variety of methodologies, from standardized patients to high-fidelity manikins, to enhance and evaluate clinical and communication skills. She is also passionate about interprofessional education and the creation and assessment of interprofessional simulations.

Yifei Liu is a tenured associate professor at the University of Missouri - Kansas City (UMKC) School of Pharmacy, and a graduate and doctoral faculty member at the UMKC Henry W. Bloch School of Management. He has a B.S. in pharmacy from West China University of Medical Sciences, and an M.S. and a Ph.D. in pharmaceutical socioeconomics from the University of Iowa. He has taught a multitude of topics in the areas of U.S. health care system, health care marketing, pharmacy practice management, health economics, and health care policy. His research has been funded by government agencies, professional organizations, and pharmaceutical manufacturers. Dr. Liu is the implementation co-lead of the Kansas City Quality & Value Innovation Consortium Opioid Management Project. He is an associate faculty in the postgraduate year 2 (PGY2) Western Missouri Psychiatric Residency Program at the Center for Behavioral Medicine, and a preceptor in Walgreens local specialty postgraduate year 1 (PGY1) community residency program at Truman Medical Centers. He was a preceptor in PGY1 community pharmacy residency program at UMKC from 2010 to 2018. In addition to being a reviewer for various journals, he is an editorial board member of Advances in Therapy and Journal of the American Pharmacists Association, an advisory board member of Dermatology and Therapy, and a guest editor for the special issue of Pharmacy on "Advancing the Knowledge and Application of Health Behavior Theories". He was an editorial board member of Research in Social and Administrative Pharmacy from 2015 to 2017. Dr. Liu has provided services to the School of Pharmacy Promotion and Tenure Committee, School of Pharmacy Research Advisory Council, School of Pharmacy Graduate Programs Committee, School of Pharmacy Diversity, Equity and Inclusion Committee, UMKC Interdisciplinary Ph.D. Executive Committee, American Academy of Addiction Psychiatry Practitioner Education Advisory Committee, and American Pharmacists Association-Academy of Pharmaceutical Research and Science (APhA-APRS) Policy Standing Committee. He was a delegate of APhA-APRS from 2019 to 2020. Dr. Liu serves as the faculty advisor for the student chapter of the Industry Pharmacist Organization (IPhO) at UMKC.

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