Overcoming COVID-19 Challenges: Using Remote and Hybrid Simulation Designs in DNP Programs
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Abstract
Simulation is a critical component of nursing and medical education used to teach skills and assess student performance. In March 2020, faculty members—including the authors—at the Grace Center for Innovation in Nursing Education at the Edson College of Nursing and Health Innovation (Edson College) simulation programs at Arizona State University quickly responded to the crisis presented by COVID-19. Within a few days, all nursing simulations were transitioned from a predominately in-person design to fully online. Maintaining simulation activities throughout the first several months of the pandemic allowed students at Edson College to meet clinical assessment objectives. This transition, implemented in 2 phases, included a detailed plan of action for all Doctor of Nursing Practice (DNP) nurse practitioner objective structured clinical exams (OSCEs). The challenges required innovative planning and flexibility while maintaining the integrity of the OSCE and simulation experience. The methods implemented out of necessity are now an important part of the authors’ curricular toolbox, providing options for continued and future educational practice. This paper details the simulations designed and implemented in 2 DNP programs: the family nurse practitioner and acute care pediatric nurse practitioner programs.

Who could have predicted that a worldwide pandemic would completely upend the Edson College of Nursing and Health Innovation (Edson College) simulation programs at Arizona State University (ASU)? In March 2020, faculty and staff of the Grace Center for Innovation in Nursing Education at Edson College, including authors J.E.O., C.A.T., and D.S., quickly responded to the crisis presented by COVID-19. Within a few days, we transitioned all nursing simulations from a predominately in-person design to being fully online. As part of the transition, we also developed a detailed plan of action for all Doctor of Nursing Practice (DNP) nurse practitioner (NP) objective structured clinical exams (OSCEs). In this paper, we describe the planning, challenges, and outcomes of the simulations designed and implemented by DNP programs at the Grace Center, which were made necessary by the COVID-19 pandemic. Examples from 2 nursing education programs are described: family nurse practitioner (FNP) and acute care pediatric nurse practitioner (ACPNP) programs.

Background
Simulation is a critical component of nursing and medical education often used to teach skills and assess student performance. Shortages of clinical placements during nursing school and the need for practice in a safe, controlled environment have led to the development of state-of-the-art simulation programs. At ASU, simulations are designed, facilitated, debriefed, and evaluated following the International Nursing Association for Clinical Simulation and Learning (INACSL) Standards of Best Practice: Simulation1 2 and Association of Standardized Patient Educators Standards of Best Practice.3 Simulation is also a valuable component of NP students’ formative and summative assessments. Observing students during rotations to ensure they have met a minimum standard of clinical competency is often insufficient. All clinical rotations may not provide equal opportunities, and assessment of key skills may not be possible. Alternatively, simulation scenarios can be validated, and reliability testing may be conducted using student assessment instruments during simulations. Recordings of simulations also allow students to review and reflect upon their performances.

Students often use manikins, task trainers, or haptic devices to practice skills and learn to assess and care for patients. In the DNP programs at ASU, simulations are used to assess NP students’ clinical skills during an OSCE. As a summative assessment component, OSCEs provide a structured methodology to objectively measure the attainment of curricular objectives and the ability to perform skills safely.4 During an OSCE, simulated participants (SPs) interact with students in a realistic health care environment. SPs are trained to portray either a patient or a patient’s family member. They respond to questions and provide appropriate physical examination (PE) responses by simulating the response or providing findings on a card.

Research has supported the value of OSCEs for teaching, assessment, and learning.4 The OSCE is a cornerstone of many clinical courses, providing students time to fully engage with interactive cases in a protected environment. The OSCE offers faculty members an additional “eyes on” visualization with students in real time and through recorded sessions.

Method
Pre-COVID-19
Before initiating safety protocols necessitated by COVID-19 in March 2020, most simulations were conducted...
in-person, with students engaging with manikins, SPs, faculty, and other students face-to-face, without the need for social distancing. In the FNP program, students conducted histories and physicals on SPs in outpatient clinical settings for all OSCEs. Students reviewed a paper chart, asked SPs questions as they sat in chairs, and conducted PEs the same way they are conducted in an actual clinic or hospital setting—hands-on and up-close to the patient. The ACPNP program also used SPs in OSCEs. Before COVID-19 necessitated changes, ACPNP students had in-person contact with an SP who assumed a family member’s role within a pediatric acute care environment. The patient was represented by a high-fidelity manikin, pre-programmed to decompensate with specific PE and monitor changes based upon each case. In these hybrid OSCEs, pre-licensure nursing students volunteered to portray the role of the bedside nurse. In-person debriefing was facilitated following INACSL standards.1

Transition to remote simulation and OSCEs

During spring 2020 (phase 1), the realities we all faced with COVID-19 made significant structural changes to simulation and OSCE implementation necessary. The usual format of in-person experiences was modified to protect the health of students, faculty, staff, and SPs. As clinical rotations were canceled, the need for and value of simulations and OSCEs for the learning and assessment of students increased. When COVID-19 disrupted the ability of DNP faculty members to perform in-person clinical site visits with students and their preceptors, the need to observe students’ patient interactions, examination performance, and real-time clinical decision making increased.

Prior experience conducting 2 telehealth OSCEs for the psych/mental health DNP program in January 2019 and January 2020 informed our plans to quickly pivot. Building upon the preexisting framework using videoconferencing to connect remote participants, we had the necessary technology and knowledge to move forward. In spring 2020, with OSCEs scheduled just weeks away, we recognized several challenges. Using a virtual modality to assess student skills during a PE lacked desired realism. Initially, we decided to focus on the interpersonal communication and professionalism skills that students demonstrate during the history portion of the OSCE. Some DNP faculty coordinators decided to eliminate the PE from the OSCE for the spring semester, while others, e.g., the FNP and ACPNP programs, chose to have students verbally describe the PE during the OSCE encounter, detailing the sequence and movements they would perform, as if they were conducting the exam in-person.

**OSCE design options**

Throughout spring and summer 2020, it was hoped that the accommodations necessitated by the pandemic would be short-lived. However, as the necessity for safety precautions continued into fall 2020 (phase 2), it became apparent that a longer-term solution would be needed. After discussing the challenges of the OSCEs conducted in the spring and summer, brainstorming sessions with DNP faculty resulted in the development of a design model to guide decision making. First, 2 primary factors surfaced that described a continuum of design options: level of realism and student opportunity to demonstrate PE skills. Additional design variables were identified: remote versus in-person student participation, remote versus in-person SP participation, inclusion of a PE, and use of a proxy for the patient (e.g., manikin, family member, or fellow student). As various design options were considered, we prioritized the objectives for each OSCE. For example, assessment of student interpersonal communication and professionalism would be a component of every design. However, the fidelity of assessing student PE skills would vary significantly, so the need for accomplishing this objective in a particular semester during the OSCE was carefully weighed for each DNP group. As a result, a model (see Chart 1 and Figure 1) depicting various design options and the strengths of each OSCE design was developed and shared with the DNP coordinators. In each column of Chart 1, designs depicting remote or in-person participation by SPs and students are categorized in each column. In Figure 1, the 9 designs are placed on the 2 continuums of realism and student opportunity to demonstrate PE skills. Each coordinator then chose a specific OSCE design in the fall semester. Various factors drove decision making: the importance of including a PE in the experience, the feasibility of students traveling to the ASU campus for in-person OSCEs, and safety considerations for SPs and students.

While campus was in lockdown from March to July 1, column A options in Chart 1 were considered for each OSCE. All participants would be remote, and PEIs would be verbalized or simulated, conducted with a proxy or in a limited fashion, or eliminated. As campus access was reinstated, column B options involving student PE demonstration in the Grace Center, without SP presence, were considered. When SPs were able to return to campus, more realistic simulations and PE demonstrations were considered using designs in column C. Column D represents the traditional OSCE. Figure 1 illustrates each design option on the continuums of realism and student demonstration of PE skills.

**Innovative SP training strategies**

In addition to conducting the OSCE remotely, SP training was modified to ensure participant safety. Before spring 2020, all training was conducted in-person and paper copies of training material were provided to SPs. In spring and summer 2020, we transitioned to vide conferencing for most SPs, and training material was emailed to them. A few SPs who did not have access to the necessary technology came to the Grace Center for training. During phase 2, it became apparent that the safety precautions implemented in the spring and summer semesters continued to be needed, and a longer-range solution for SP training was developed. Using Canvas, the course delivery system already in place at ASU, an SP training website was developed and used to provide all case material, work logs, and evaluations used during the OSCEs.

**Implementation**

OSCE modifications were implemented in 2 phases. In phase 1 (spring and summer 2020), the programs pivoted from fully in-person to remote experiences using videoconferencing (see #4 in Chart 1 and Figure 1). Most SPs and faculty logged in from home, while a few SPs and faculty members came to the Grace Center, maintaining all safety precautions. All students accessed the Zoom online platform from remote
**Chart 1**

**OSCE Designs Differentiated by Remote or In-Person Participation by Students and Simulated Participants**

| A. Both SP & Student Participate Remotely | B. SP Remote & Student In-Person (Modified or Hybrid OSCE) | C. Both SP & Student In-Person (Modified or Hybrid OSCE) | D. Both SP & Student In-Person (Traditional OSCE) |
|------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------|
| ▲ = Symbol on Diagram                     | □ = Symbol on Diagram                                         | □ = Symbol on Diagram                                         | ▲ = Symbol on Diagram                             |

1. No PE component included. Only history conducted.  
2. Limit PE to items SP can demonstrate remotely.  
3. SP demonstrates limited PE components remotely. Student told that an RN visited SP before exam to conduct PE. PE assessment provided by faculty upon request.  
4. SP demonstrates limited PE components remotely. Student verbalizes remainder of the PE, possibly using diagrams to facilitate portions not conducive to SP demonstration. Ex: “I’m conducting an abdominal exam now, auscultating 4 quarters” (they can draw on a diagram shared on camera).  
5. Student demonstrates PE remotely, using proxy patient, e.g., roommate.  
6. Student conducts PE on manikin. SP participates remotely via a monitor/screen in the exam room.  
7. Student conducts PE on another student. SP participates remotely via a monitor/screen in the exam room.  
8. Student conducts PE on manikin. SP participates in-person for history and plan of care.  
9. Student conducts PE on another patient. SP participates in-person for history and plan of care.  
10. Student conducts modified PE on SP, only approaching from behind SP.  
11. Student conducts full H/P on SP.  

**Figure 1** OSCE designs demonstrating levels of realism and physical exam demonstration opportunities. Abbreviations: PE, physical examination; pt, patient; SP, simulated participant; OSCE, objective structured clinical examination.
locations. In phase 2 (fall 2020), hybrid OSCEs were conducted by FNP and ACPNP programs. Clinical replacement hours of 2 hours per 1 hour of time spent were given based upon recommended guidelines. Evaluation form content, including faculty-developed rubrics and SP evaluations of student interpersonal communication and professionalism skills, remained unchanged, but all SP evaluations were conducted online using an electronic data collection system, REDCap.

**FNP simulations**

Before COVID-19, pre-OSCE orientations for students occurred in-person 15 minutes just before the OSCE event. In phase 1, the orientations for the FNP OSCEs were changed to an hour-long videoconferencing format scheduled several days before the OSCE, allowing additional preparation time and more robust discussions. In phase 1, FNP case content remained unchanged from pre-COVID-19 OSCEs. Charts with patient information were shared with students at the beginning of the OSCE via screen sharing by faculty. Students were then able to interview the patient while verbalizing intended actions. For example, at the appropriate points, the student would state, "I have washed my hands," "I have draped the patient appropriately," and "I am listening to posterior lung sounds side to side at 8 points." Recordings of each OSCE were obtained via Zoom, allowing faculty to recheck a student's performance and allowing the students to view their work post-event for self-reflection assignments.

During phase 2, orientations were again conducted via videoconferencing. During the OSCE, the FNP program used a multifaceted approach, with students and SPs in-person, while using full-sized manikins on exam tables in patient rooms (see #8 in Chart 1 and Figure 1). Together, the SP and the manikin served as one patient. The SP provided all subjective information and could perform some requested actions that did not require touch; all other examinations were conducted on the manikin. This allowed students to perform examination skills rather than verbalizing intended actions, giving them additional opportunities to practice, and giving faculty the added benefit of watching students' PE skills. Video recording was conducted via SimiQ in the Grace Center and available to both students and faculty post-event. In addition, post-OSCE review and small group debriefings were added via Zoom during the following week, allowing continued processing of the case study content.

**ACPNP simulations**

During phase 1, ACPNP students rapidly transitioned to a fully remote OSCE. Upon entering the Zoom OSCE, the student saw the assigned faculty's shared screen with a brief patient description. The NP student obtained subjective information from an SP (a confederate) portraying the patient's family member. The NP student could also see the patient, represented by a high-fidelity manikin, and the patient's monitor. Similar to the modified/hybrid model, the patient was in the pediatric acute care environment and was pre-programmed to compensate with specific PE and monitor changes based upon each specific case.

The NP student verbalized the PE as they conducted the assessment. Faculty verbalized additional information regarding pertinent positive findings during the case. For example, if a patient presented with septic shock and the student stated that they were assessing perfusion by palpating pulses and measuring capillary refill, the faculty member stated that the patient's extremities were cool to touch, pulses were weak, and capillary refill was greater than 3 seconds. The NP student continued working through the case, asking for additional details from the confederate, talking through the assessment, and articulating their interventions until the case came to its predetermined conclusion or preset time expired.

During phase 2, in fall 2020, the ACPNP OSCEs returned to the original pre-COVID, in-person format. PEs were conducted on manikins. Social distancing of participants was maintained, and all students, SPs, and faculty wore face masks.

The challenges presented by the COVID-19 pandemic required innovative planning and flexibility while maintaining the integrity of the OSCE and simulation experience. A variety of learning modalities enabled Edson College faculty to continue offering experiential learning in a rapidly changing system. Innovative strategies ensured the safety of all stakeholders. Students were gratified to continue their learning uninterrupted and receive feedback from faculty on
their patient assessment and management skills. The methods implemented ensured learning objectives were met, and student assessments continued to provide critical information to guide feedback and inform evaluative decisions. Modalities created out of necessity are now part of the Grace Center’s curricular toolbox, providing more options for future educational practice and strategies for future unexpected situations requiring modified experiential learning and assessment designs.

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