Innovative Teaching Strategies Using Simulation for Pediatric Nursing Clinical Education During the Pandemic: A Case Study

Tamara C. Cook, DNP, APRN, FNP-BC, CPN, and Logan J. Camp-Spivey, PhD, MSN, RN

Abstract

Existing challenges associated with pediatric clinical placements for prelicensure nursing students were heightened when clinical agencies halted nursing student entry in response to the COVID-19 pandemic. At the same time, the pandemic created opportunities for innovative teaching strategies for pediatric clinical rotations in nursing education. The purpose of this project was to design, develop, and implement meaningful, interactive, and intentional clinical experiences for nursing students that enhanced their pediatric assessment skills, reduced their anxiety about pediatric inpatient care, and advanced their proficiency in the nursing process. Two simulated clinical experiences were created: (1) a virtual pediatric physical assessment checkoff and (2) a pediatric escape room. The pediatric physical assessment checkoff was performed in a remote, virtual setting while students used personal resources to demonstrate their assessment skills. For the escape room, students worked in small, in-person groups using the nursing process to unlock clues to improve their client’s health condition. Students reported gaining meaningful clinical experiences through simulation that allowed them to apply their nursing knowledge and increased their confidence in pediatric assessment skills, dosage calculation competency, communications and interactions with the pediatric population, and teamwork abilities. The virtual pediatric physical assessment checkoff and the pediatric escape room were enjoyable and beneficial educational events that facilitated student learning.

The coronavirus disease 2019 (COVID-19) pandemic brought new challenges to nursing education, forcing academic programs to develop novel strategies and alternative instructional methods for didactic and clinical learning.1,2 These challenges have generated opportunities to be creative and pioneering in educating nursing students. Within our school of nursing, located in the Upstate region of South Carolina, didactic instruction was transformed to an online format using synchronous and asynchronous lectures during spring and fall 2020 and spring 2021. Changes within our program and in many others extended beyond the restructuring of lectures to also include clinical courses. These experiences, which aid students in applying nursing knowledge within clinical areas, were not easy to convert to virtual settings.3 At the beginning of the pandemic, clinical partners prohibited student entry into facilities where students would normally gain hands-on training under instructor supervision. In these environments, students traditionally interact with clients and have opportunities to apply their critical thinking, clinical reasoning, and clinical judgment abilities and perform nursing skills in real life situations. Clinical experiences are difficult to duplicate, especially without access to human clients. Without these live experiences, students and faculty feared the loss of transfer of nursing knowledge to the clinical setting, which is needed to provide competent client care. Therefore, innovative simulation strategies were used so students could have meaningful clinical experiences beginning in spring 2020.

Background

The Mary Black School of Nursing at the University of South Carolina Upstate offers both Bachelor of Science and Master of Science degrees in nursing. Before the pandemic, arranging pediatric clinical courses for our prelicensure nursing students was already challenging due to low pediatric inpatient census, competition among nursing programs for pediatric student placements, and limited pediatric health community partners. The pandemic further heightened these issues because specialty pediatric units had to reorganize and create space for the influx of clients with COVID-19. Moreover, at the onset of the pandemic, community health partners, such as local county school districts, prohibited student nurses from entering school buildings and working with school children. These changes eliminated our contact for on-site health screenings, like hearing and vision, and created additional barriers to obtaining clinical hours. Hospital organizations also prevented in-person student entry, making student opportunities for clinical experiences nonexistent. Without these experiences, students were unable to practice applying their pediatric nursing knowledge.

Purpose

The purpose of this project was to design, develop, and implement meaningful, interactive, and intentional clinical experiences for nursing students. The objectives were to enhance nursing students’ pediatric assessment skills, reduce their anxiety about pediatric inpatient care, and advance their proficiency in the nursing process. Two innovative pediatric clinical simulations were designed and developed during spring 2020 and implemented in spring and fall 2020: a virtual pediatric physical assessment checkoff and a pediatric escape room.
escape room. Pediatric assessment skills built on previous health assessment knowledge, with modifications based on the client's developmental age group. The nursing process—incorporating assessment, diagnosis, planning, implementation, and evaluation—served as a framework to guide the provision of holistic care and foster critical thinking, clinical reasoning, and clinical judgment. Simulation was used to create a safe and structured space for students to perform skills without pressure from the client and caregiver and to practice in a controlled setting to increase preparedness for other clinical environments.

Approach

Virtual pediatric physical assessment checkoff: Spring 2020 simulation experience

Virtual clinical experiences are effective and inventive approaches for clinical training. In response to remote learning requirements due to COVID-19 for the second half of spring 2020, the virtual physical assessment checkoff involved students performing an assessment of a pediatric client using their personal resources. Students’ learning objectives for the checkoff were to: demonstrate knowledge of the differences in pediatric and adult physical assessments, complete a physical assessment of a pediatric client in the expected 10-minute time frame, identify all major body systems and assessment skills for each system, and measure age-appropriate vital signs. To help students prepare for the checkoff, they were able to view live demonstrations by clinical instructors and were given a grading rubric that corresponded with the learning objectives. For the checkoff, students were assigned to complete a physical assessment educational module for each developmental age group, including infants, toddlers, preschoolers, school-age children, and adolescents. Students were also required to video record and submit 1 hour of practice time using the rubric as a guide.

Students were assigned a date and time to meet virtually with their clinical instructors using audiovisual equipment. Students demonstrated their physical assessment skills on a simulated pediatric client, and students were creative with their clients. Clients included inanimate objects, such as baby dolls, pillows, and paper drawings of children, as well as actual live children. During assessments, students displayed how to communicate and build rapport with the simulated client. Clinical instructors provided immediate feedback to students following the checkoff using the grading rubric. The grade earned was either satisfactory or unsatisfactory. If an unsatisfactory grade was earned, the student received additional feedback to be successful and was required to complete one additional hour of practice. The student then had another attempt to complete the virtual pediatric physical assessment checkoff.

Pediatric escape room: Fall 2020 simulation experience

Students in our program returned to in-person clinical experiences in fall 2020. The pediatric escape room was a competitive event where a small group of students cooperatively discovered and solved clues and puzzles and accomplished tasks to progress and meet a specific goal in a limited time frame. Educational escape rooms have been described as collaborative learning opportunities that require students to problem solve, think critically, and work as a team. The International Nursing Association for Clinical Simulation and Learning Standards of Best Practice: Simulation Design and Kolb’s Experiential Learning Theory guided the design and development of the escape room. Students’ learning objectives for the pediatric escape room were to: apply the nursing process; use critical thinking, clinical reasoning, and clinical judgment skills; collaborate and effectively communicate with group members; and provide safe and competent client care.

Due to COVID-19, precautions were taken for everyone’s safety during the escape room. Students’ temperatures were scanned before entry into the Simulation Center for Teaching Excellence, and they were required to wear masks. Students were assigned to groups of 4 in the escape room and given designated areas to stand to maintain social distancing. The room was equipped with a Laerdal SimJunior simulator wearing a nasal cannula in a hospital bed. The simulator was programmed with abnormal lung sounds and an irregular breathing pattern. Escape room instructions explained that there was a maximum time limit of 25 minutes to escape. Extra clues were available upon request, but each clue incurred a 1-minute penalty. The following pediatric client scenario was presented to each group:

**Name:** Ben Smith  
**Age:** 6 years old  
**Date of Birth:** 07/20/XX  
**Situation:** Ben was in his physical education class at school when he became short of breath. He was unable to catch his breath despite being given his albuterol inhaler by the school nurse. An ambulance was called, and he was transported to the hospital.  
**Background:** Ben has a history of environmental allergies and asthma. His home medications are cetirizine 5 mg daily, montelukast 5 mg at bedtime, budesonide 3 puffs twice a day, and albuterol 2 puffs as needed for shortness of breath.  
**Assessment:** Ben is still short of breath despite receiving supplemental oxygen via nasal cannula with occasional wheezes and stridor. He has retractions and cannot complete full sentences.  
**Recommendation:** Titrate Ben’s supplemental oxygen to keep his oxygen saturation > 92%.  
**Free clue:** Start with the nursing process.

Students were expected to begin with a client assessment. Once students verbalized the need to obtain vital signs, the monitor screen was uncovered to display the client’s pulse, respiations, oxygen saturation, and blood pressure. The first clue was located on a lock box with numerical respiratory ranges and a 4-letter word beside each range. The client’s respiratory range and the 4-letter word beside it unlock the box, giving students their next clue. Inside the lock box were 2 envelopes describing the client’s respiratory range: expected or unexpected. If students chose the “expected” envelope, the instructions inside told them to assess respirations again. If they selected the “unexpected” envelope, students found a flash drive inside. The flash drive had a growth chart, client vital signs, medication administration record (MAR), and other unnecessary documents as distractors. The MAR was a locked Word document on the flash drive that could be inserted into a computer in the room. Along with the 2 envelopes, there was also a puzzle in the bottom of the lock box. The puzzle had a written dosage calculation for prednisolone. The puzzle stated: “What dose will you give? Client weighs 44 pounds. Prednisolone is dosed 1 mg/kg/dose.” The correct dose of 20 mg would unlock the MAR on the flash drive.

Once students accessed the MAR, medication orders were listed for the
There was another lock box containing medications. The medication lock box was labeled with different types of lung sounds with corresponding 4-digit codes. The code for the correct type of lung sound assessed unlocked the box. When the medication box was unlocked, students found an inhaler, a spacer, liquid prednisolone, and oral syringes. Students were expected to administer the inhaler and oral prednisolone with accurate dosing. If medications were administered appropriately, the client’s vital signs were adjusted to reflect improvements. Client reassessment was required to stop the timer and escape the room. The group with the fastest time won the escape room event. All students who successfully completed the escape room were rewarded with a certificate that stated, “I escaped.” There was no grade associated with the pediatric escape room.

Students participated in a faculty-facilitated debriefing session following the escape room. The 3D Model of Debriefing guided this 50-minute session. Debriefing gave students an opportunity to consider their strengths and areas for improvement. Reflection questions included: How did it feel to work through the pediatric escape room? Were you satisfied with your ability to care for the client? What was done well, and what could have been handled differently? What did you learn, and how can you apply this knowledge to future clinical practice? How could this simulation experience be improved? Is there anything else you would like to discuss?

**Outcomes**

Fifty-three students participated in the virtual pediatric physical assessment checkoff in spring 2020. Student feedback was collected through an electronic simulation evaluation instrument that was a modified version of the National League for Nursing’s Simulation Design Scale. Results demonstrated that students who completed the instrument (n = 27) strongly agreed or agreed that the purpose, objectives, and expectations of the checkoff were clear; they developed a better understanding of nursing assessments; they enhanced their client communication abilities; they were able to apply knowledge and skills obtained from class; and they felt better prepared for future physical assessments. In the instrument’s comments section, students expressed appreciation of the virtual experience despite pandemic-related challenges.

Seventy-five students participated in the pediatric escape room in fall 2020. Before the escape room, students answered 5 questions on an electronic pretest evaluation tool. This tool was developed by faculty based on the literature used to design and develop the pediatric escape room. The questions were: How confident are you in your assessment skills of a pediatric client? How confident are you in your ability to perform dosage calculations for a pediatric client? How confident are you in communicating with the pediatric population? How confident are you in interacting with the pediatric population? How confident are you in working as a team with others? Students rated their confidence as extremely confident, very confident, somewhat confident, not so confident, or not at all confident. Following participation in the escape room, students completed the posttest evaluation tool, which included the same 5 questions. Pretest and posttest results are presented in Figure 1 and Figure 2. In both figures, highest response
percentages for each question are bolded. In Figure 2, if nonresponses had the highest percentages, we evaluated actual responses for the highest response percentages.

All students (N = 75) answered the pretest questions. Based on the highest percentage of pretest responses (Figure 1), students were somewhat confident in assessment skills (56.0%, n = 42), very confident in dosage calculations (38.7%, n = 29), very confident in pediatric population communication (38.7%, n = 29), somewhat confident in pediatric population interaction (58.7%, n = 44), and very confident in teamwork (45.3%, n = 34). Fifty-two students answered the posttest questions. Compared with pretest results, changes in the highest percentage of actual responses on the posttest revealed increases in students' overall confidence levels after completing the pediatric escape room (Figure 2—nonresponses not considered): very confident in assessment skills (29.3%, n = 22), extremely confident in dosage calculations (25.3%, n = 19), very confident in pediatric population communication (37.3%, n = 28), very confident in pediatric population interaction (30.7%, n = 23), and extremely confident in teamwork (34.7%, n = 26). These results reflect the educational value of the pediatric escape room in preparing students for clinical experiences with children in hospital and community settings.

Discussion

The COVID-19 pandemic changed traditional clinical experiences for prelicensure nursing students. The expanded use of technology and the implementation of innovative strategies were crucial to continuing meaningful learning. Through participation in a virtual pediatric physical assessment checkoff and a pediatric escape room, student engagement and feedback demonstrated progress in confidence, assessment skills, communication, critical thinking, clinical reasoning, and clinical judgment related to the pediatric population. These results are consistent with previous studies involving simulation in nursing education.4,9,12,13 There are limited pediatric simulated experiences available, and this project is a valuable addition to the literature for other programs.

Some limitations of this project are: the checkoff and escape room were both conducted with nursing students in the Upstate region of South Carolina and have not been delivered in other programs or geographic areas, self-reported measures were used for data collection, there were missing data from the simulation evaluation instrument and the posttest evaluation tool, and the project was not designed for statistical significance.14 Opportunities for expansion of these simulation experiences include additional common pediatric diagnoses; different developmental age groups; and alternative settings, such as telehealth and outpatient locations. Furthermore, the virtual pediatric physical assessment checkoff and the pediatric escape room could be delivered in more nursing schools and offered to nurse residency/transition-to-practice programs for onboarding purposes and competency.

Conclusion

Use of simulation for clinical experiences can enhance nursing students' decision making, critical thinking, clinical reasoning, clinical
judgment, and psychomotor abilities. Innovative teaching improves students’ comprehension of topics, and face-to-face and virtual simulation caters to a variety of learning styles. The virtual pediatric physical assessment checkoff provided hands-on demonstration of assessment skills. This method gave students an opportunity to receive immediate feedback for learning. The pediatric escape room offered several educational benefits to students, including experience performing under pressure and an opportunity to improve communication. The escape room encouraged students to think quickly and critically and offered a more active alternative to assessing theoretical and practical knowledge. The pandemic forced nursing educators to try new ways to meet learning objectives via technology and other methods. With limited access to live client care further exacerbated by the pandemic, we used creative and engaging teaching strategies to enhance learning.

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