Creating Online Clinical Experiences for Prelicensure Nursing Students Using the ADDIE Model

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Abstract. Prelicensure nursing programs utilize simulation to prepare students to provide safe and effective patient care. The COVID –19 pandemic prompted the need for an online computer-based clinical experience. A product designed for high-fidelity laboratory simulations was modified for online delivery. Our purpose was to analyze the design, implementation and evaluation of the online clinical experiences using an instructional design model (ADDIE) and conclude with lessons learned. This paper describes how to utilize an informational technology system in a fully online manner. The product provided meaningful online clinical experiences for both junior and senior cohorts of prelicensure nursing students.
Keywords: Computer-based simulation, simulation, ADDIE model, Undergraduate nursing students, teaching method

Introduction

Computer-based simulation is increasingly being used to replicate a clinical experience. Simulation strategies vary and include laboratory-based manikins that provide face-to-face experiences and online avatars that are computer-based. The International Nursing Association for Clinical Simulation and Learning (INACSL) Standards Committee defines computer-based simulation as: "A simulation-based learning activity designed to provide an experience through the use of an alternative medium. Learners can complete specific tasks in a variety of potential environments, use information to provide assessment and care, make clinical decisions, and observe the results in action (INACSL (2016)".

There are both advantages and disadvantages to using computer-based simulation for experiential learning. "Computer-based simulation is convenient, interactive and offers self-directed access for the undergraduate nursing student" (INACSL, 2016). Although there are costs associated with simulation facilitation by faculty members, their workloads can be reduced because virtual simulation facilitates learning experiences for large cohorts of students (Foronda, Swoboda, Henry, Kamau, Sullivan, & Hudson (2018). A study by Fraga, Couto da Silva, and Murai, on "online social networks in Health Care posited that online environments safe costs as compared to face to face clinical interventions" (Fraga, Couto da Silva, & Murai 2018). A challenge to teaching in a

virtual environment, however. is the need for faculty development. A study by Sinacori revealed that "nurse educators need technological support and mentorship when transitioning to the virtual mode of teaching" (Sinacori, 2020). Such support is required for the effective delivery of quality simulation in a virtual environment that facilitates meaningful learning. "The behavior to use an information system are aided by experience with computers and attitudes toward the system" (Horan, Tulu, Hilton, & Burton, 2004).

"Computer-based simulations utilize modeling of life processes in which inputs and outputs are conducted with computer technology e.g., keyboard, mouse or assistive devices" (Healthcare Simulation Dictionary, 2016). In this paper, we discuss how computer-based simulation was integrated into ~~a~~n undergraduate nursing curriculum for prelicensure students to create meaningful clinical experiences. Participants were accelerated first semester (junior level) and last semester (senior level) nursing students, who had achieved a bachelor's degree or higher prior to admission to the program.

The product consisted of multiple simulation scenarios across core nursing content areas. The scenarios were originally designed to be implemented as high fidelity scenarios in a laboratory setting, and include faculty facilitator packets of scripts, pre-briefing and debriefing materials, and evaluation templates. College administrators were drawn to the product's realistic and comprehensive Electronic Health Record (EHR) as well as extensive supporting materials including videos, quizzes and reference resources. Two clinical faculty were recruited as leaders to design online clinical experiences based on the product's cases and corresponding EHR data.

Organization Plan

Virtual clinical experiences were developed to meet course objectives by incorporating diverse patient scenarios. INACSL standards were used to guide the design. To illustrate a typical simulation for the senior cohort, the following lesson plan was used for a complex gastrointestinal case (colon resection). First, learning objectives were provided, followed by a series of pre-briefing activities. Reading assignments followed and were focused on concept review and an SBAR (situation, background, assessment, & recommendation) report on the assigned patient. A series of advanced skills videos were then viewed by students, after which they were directed to enter the online folder of their assigned clinical faculty member for a pre-simulation quiz. Next the student accessed the electronic health record (EHR) of the patient and reviewed the patient summary report. Detailed instructions guided students through changes in the patient's status. For instance, students located laboratory results and radiology reports, assessed charting related to the patient's intravenous access device, and then completed documentation related to a series of questions about the patient (e.g., What type of nutrition was the patient receiving and how was it administered?).

As virtual time passed, additional information was provided about changes in the patient's status. Vital sign changes required reassessment of the patient and a change in the plan of care. Problem-solving activities followed including the need to create an incident report based on the discovery of a medication error. In the final step, students created an SBAR report for communication with the healthcare provider, and as part of the debriefing process, the students completed a reflection log based on Quality and Safety Education for Nurses (QSEN) competencies. Students met virtually for weekly

synchronous debriefing sessions with faculty. A similar approach was used for creation of scenarios in the fundamentals course for junior level students. There were 87 students who completed the junior level clinical course, and 124 who completed the senior course.

For continuous quality improvement, mid-semester feedback was solicited from students and faculty, and anonymous surveys were collected from students. Faculty were surveyed during team meetings. Process changes were incorporated into the design and development of the virtual experiences after receiving this feedback. These changes improved the user and faculty experience as evidenced by final course evaluations and faculty huddles. The differences in cohort presentations are noted in table 1.

Instructional Design Model

"To analyze the development, implementation and evaluation of these virtual clinical learning experiences, an effective framework for learner-centered instruction and training was needed" (Robinson & Dearmon, 2013). The instructional design model chosen has five interrelated phases: analysis, design, development, implementation and evaluation (ADDIE). "The ADDIE model was initially used to assess military training and has evolved since World War II as an iterative process to analyze and evaluate effectiveness in training" (Allen, 2006). Used as a systems approach method, the ADDIE model draws from multiple disciplines including process improvement, system engineering, and behavioral and cognitive psychology and it "identifies and addresses gaps in delivery of educational and training materials" (Kurt, 2018). A study by Ab Latif and Mat Nor noted that the "ADDIE model was helpful to develop and validate the Rusnani concept mapping (RCM) which could improve the educator's instruction strategy and increase nursing students in patient care" (Ad Litif & Mat Nor, 2020). Design, implementation, and evaluation of the virtual clinical experience was assessed using the ADDIE model in this paper.

Analysis Phase

The analysis phase focuses on the audience or recipients of the simulation, their knowledge level, and what they should know after completing the course. Allen stated "that understanding the gap between what the student knows and what they need to know for effective performance helps determine the learning objectives" (Allen, 2016. Establishing goals in this phase began with how to train faculty and students who had no previous exposure to the platform. Faculty received two training sessions prior to the start of the semester. Two faculty members, one assigned to each cohort, were trained as "super users," users who were knowledgeable in designing and implementing the product. Orientation and onboarding of students and faculty to simulation-based learning system occurred in an online web conferencing platform, which was Zoom.

Design Phase

"The design phase of the ADDIE model focuses on selecting the instructional methods and media for matching goals and determining the most effective instructional strategies" (Allen, 2006). In this phase, learning objectives, lesson plans, instructional

content, and various assessment tools were developed to measure performance. Both cohorts had specific learning objectives. Weekly modules were organized with media resources, patient reports, pre-simulation exercises, a pre-sim quiz, electronic health record (EHR) assignments, post-sim exercises, a post-sim quiz, and reflective journaling. Administrative staff were recruited and trained to support faculty to create individual clinical faculty folders and individualize the assignments with due dates and specifications as directed by the faculty coordinator. There were a number of differences noted between cohorts in the way the simulation scenarios were structured and implemented. These are listed in table 1.

Development Phase

"The development phase of the ADDIE model began with production and testing of the outputs from the analysis and design phases. In this phase, lesson materials are reviewed and validated and may need revision" (Allen, 2006). Each patient scenario was aligned with course objectives and reviewed for complexity that would be appropriate for each cohort. In short, junior nursing students were assigned patients with fundamental needs while the senior nursing students were exposed to complex cases. The EHR provided a venue for documentation of basic care and systems assessment, which included SBAR tools and care plans. EHR assignments were created and due dates varied by cohort.

Implementation Phase

"The implementation phase of the ADDIE model occurs when the plan becomes operational" (Allen, 2006). Online synchronous meetings began with orientation sessions that included all faculty and students in the specific cohort. Within the smaller clinical groups, faculty demonstrated activities within the module and the EHR until students were prepared for independent work. Once familiarity was established, preplanned weekly lessons began to unfold. Instructions for clinical activities were presented in a chronological order and broken into time-based phases to reflect movement through a clinical day. Case-related prework consisting of quizzes and exercises was assigned.

Debriefing was conducted synchronously with students assigned to Zoom breakout sessions in which they discussed debriefing questions relevant to the scenario. Students then reconvened to the larger group to further discuss the case with faculty. Synchronous sessions helped faculty members assure that any performance issues or critical concepts arising from the simulation were adequately addressed. Both cohorts had assignments within the EHR that included: documentation of vital signs, physical assessments, medications, use of tools such as SBAR Morse scale, and care plan management.

Evaluation Phase

The evaluation phase of the ADDIE model includes a process of formative and summative evaluation throughout all phases of the instructional design. All "activities focus on continuous quality improvements of the overall system" (Allen, 2006). Mid-semester student surveys and faculty meetings dedicated to improving experiences were

scheduled. Formative evaluation of student performance was also accomplished by the assigned instructor and constructive feedback was provided**.** We were anecdotally able to see the success of the implementation of the online experiences. According to course faculty, students were better engaged, had a better recall of condensed content, and improved at navigating the electronic health record. Summative exam success included a course pass rate of 100% for both cohorts.

To formally evaluate the effectiveness of the design and delivery of the online virtual clinical modules, lead clinical faculty consulted internal reviewers from the Center for Teaching Excellence at the university. The reviewers used university-specific criteria and "standards from Quality Matters" in the following areas: course overview and introduction, learning objectives (competencies), assessment and measurement, instructional materials, course activities and learner interaction, course technology, learner support, accessibility and usability, instructor team presence (university-specific), community and relationships (university-specific), and feedback (university-specific) (Quality Matters 2020),. The reviewers were particularly impressed with the well-balanced synchronous and asynchronous interactions of the activities. These activities helped to create student engagement and a sense of community. The feedback regarding areas for improvement included (1) providing a clear road map to guide students through the modules and (2) enhancing organization and intuitive course design approaches that provided connections between learning activities and overall learning outcomes. Lead clinical faculty were encouraged by the preliminary feedback and aimed to continue to improve and evaluate design functionality.

Lessons Learned

There were multiple lessons learned while bringing clinical experiences into the virtual environment. These lessons include the following: need to conduct a usability test for students and faculty prior to purchase, create a transition from a live environment to a virtual one due to COVID-19, create a recognizable modular layout, create a storyline for students, plan activities to promote student and faculty success in use of product, promote peer collaboration, engage critical and clinical thinking with assignments, and provide staff/faculty specific structured guidance. Although the virtual clinical experience lacked the psychomotor component, online simulations gave students more time to clinically reason and critically think. Faculty need to be judicious and realistic in identifying what components to assign a score; create a zero-point scoring system; create due dates that coincide with the clinical day, e.g. have all work due on the clinical day by 11:59 pm and have administrative support for platform construction.

Conclusion

The ADDIE Model facilitated assessment of computer-based clinical experiences for pre-licensure nursing students and use of the platform brought clinical experiences into an online classroom. The vast number of scenarios and the versatility of the platform enabled faculty to create meaningful patient experiences for student learning. Multiple aspects of online clinical simulations need to be considered to ensure a relevant and productive student experience. These include usability training, administrative and support, formative and summative feedback from students and faculty, and an achievable

grading plan. Also, the ability to create a meaningful patient story that challenges the student and carries them through a 5 to 6-hour clinical day is essential. Finally, a thorough orientation, clear instructional layout and technical support for both students and faculty are also keys for success.

Table 1:

Cohort Differences using the ADDIE model

ADDIE Phase	TOPICS	Incoming Students	Graduating Students
Analyze	Course	Fundamentals of Nursing	Complex care/medical surgical/adult
	Content	Inpatient/community, basic cases	Inpatient/critical care, advanced cases
	Orientation to online platform	2 hours. X 3weeks.	2 hours X 1 week
	Student activities	3 hours. weekly asynchronous	6 hours. weekly asynchronous
	Debriefing	1-hour weekly faculty led, synchronous	2 hours. weekly faculty led, synchronous
Design	Designer	One faculty member	Two faculty members
	Student role	Student as Care plan designer	Student as Care plan manager and coordinator
	Focus	Skills focused/Sequential steps	Management focused/Care design
	Case scenario activity	Case scenario (seek and find)	Case scenario (unfolding over time)
	EHR documentation	Basic care and system assessments	Basic care and system assessment with additional skills: medication reconciliation/teaching, discharge planning, incident reporting
	Journaling	Reflective journaling of simulation experience	Reflective journaling of QSEN (knowledge, skills, attitudes)
Develop	Assignment length and due date	4 hours duration, due in 1 week	Assignment period: 6-8 hours duration, due in 2 days
	New materials	posted 1 week ahead	posted 2 days ahead
	Assignment	Individual assignments	Individual and group assignments
	Mid-semester modifications	align pre and post activities with course	Added journal articles

ADDIE Phase	TOPICS	Incoming Students	Graduating Students
Implement	Faculty guidance	basic nursing care, SBAR report, care plan expectations, usability of EHR, charting relevant data	usability of EHR technology, refining care plans and SBAR
Evaluate	Mid-semester: Results of student surveys	*Positive feedback* • Improved usability of EHR with repetition • Enjoyed vast patient cases • Debriefing was essential and helpful *Improvement* • More training • Clearer instructions	*Positive feedback* • Increased experience with documentation and incident reporting • Greater opportunities to problem solve with clinical faculty • Better understanding of SBAR and interprofessional communication *Improvement* • Clearer instructions • More challenging scenarios and activities
	Opportunities	• Anticipate utilization struggles • Set defined timeframe and expectation for students	• Check errors in platform settings with individual faculty folders • Create challenging activities
	Faculty feedback	• Student utilization struggles • Comfortable with platform	• Staff issues with module construction accuracy • Improved exit HESI scores
	Action	Revised student instructions	Augmented student activities

Source: ADDIE Implementation Stages

Note. This table depicts the differences used within each phase of the ADDIE model for each cohort of nursing students. EHR-electronic health record; SBAR-situation, background, assessment, recommendation; QSEN-Quality and Safety Education for Nurses; HESI-Health Education Systems Incorporated

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