

# Development of a pharmacy critical care elective utilising online case-based patient simulations

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## Abstract

**Description:** An innovative critical care elective was created that combines didactic teaching with case-based discussions utilising online electronic health record technology.

**Evaluation:** A total of 12 students completed the course and a post-course survey was administered. The results from the post-course surveys resulted in the majority of students reporting a perceived improvement in problem solving abilities and advanced practice pharmacy education (APPE) preparedness.

**Conclusion:** This assessment suggests that the integration of online simulated patient cases into a critical care pharmacy elective course is viable and may help students develop problem solving abilities.

**Keywords:** *Critical-care, Elective, EHR, Online, Simulation*

## Introduction

Elective courses are offered within the majority of pharmacy schools for the purpose of individualising a student's education within a given curriculum (Santee *et al.*, 2012). Many pharmacy schools offer critical care electives designed to challenge students to foster critical thinking skills such as logical thinking and problem solving for critically ill patients (Dager, Bolesta & Brophy, 2011). Recently, advance in technology has dramatically changed the way instructors and students learn and teach (McAlister, 2009). Students are now utilising web-based technology, which is shifting instruction towards interactive virtual classrooms (Skiba, 2005; Sandars & Morrison, 2007). As the use of electronic health records (EHR) has increased within the healthcare field, it seems reasonable that EHR simulations should be incorporated into pharmacy curriculums to better develop practice-ready students for advanced pharmacy practice experiences (APPEs). This paper describes the development of a newly offered critical care elective course. This innovative elective course consists of three parts: didactic lectures on critical care topics, online EHR patient simulations utilising EHR Go! (Archetype Innovations, Duluth, Minnesota), and in-class patient case presentations.

## Description

A three-credit critical care elective course was offered over the course of 15 weeks, spring semester of 2018 at Long Island University Pharmacy (LIU in Brooklyn, New York). The course was offered to twelve students in their third year of the pharmacy programme (four year programme with the last year reserved for APPE rotations). This course utilised a combination of didactic lectures and case-based small group activities. The online cases utilising EHR Go!, an online EHR simulation, were used in this course to mimic real-life patient scenarios. EHR Go! technology consists of an EHR platform as well as computerised physician order entry (CPOE) systems, and on the first day of class, students completed an orientation activity. Each week, instructors provided 50-minute didactic lectures on various critical care topics. After the lecture, students broke into groups of three (four groups in total) for another 50 minutes to work up an online simulation case. The weekly-simulated online patient cases were meant to reinforce the preceding lecture. Online patient case simulations allowed students to explore and extract data from patient health records and become familiar with navigating an EHR. Course faculty created corresponding EHR simulations for the critical care topics described in each lecture. Simulations were created to highlight data

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students would be assessing in a real-world intensive care unit (ICU) setting. For example, for the simulation of a patient with acute respiratory distress syndrome, students were assessing ventilator settings, chest x-rays and other information related to the case. Depending on the topics, some patient cases were used sequentially to demonstrate the evolution of a patient case.

Upon completion of the patient case work-up, a group was selected at random to present as if they were presenting an actual patient case during clinical rotations, with the course instructors facilitating discussion amongst the groups. During the discussion, course instructors would engage students from all groups to compare and contrast assessments, present hypothetical situations, and provide real life experience to connect major focus points for each work-up. Three course instructors trained in critical care were responsible for the content of the course. A total of nine electronic simulation patient cases were developed by the course instructors and offered throughout the semester.

Two multiple-choice and fill-in the blank exams created by course faculty were administered in this course. For the final exam, students were given two written critical care patient cases encompassing most of the topics covered throughout the course. After completion of the course, students completed a 5-point Likert scale perceptive survey that was piloted regarding course satisfaction and utilisation of EHR simulation in the classroom. Consent was obtained from students with a statement in the survey regarding collection and de-identification of the data that students agreed to in completing the survey. This study was approved by the institutional review board at LIU.

### Evaluation

All 12 students completed the post-course survey. The survey questionnaire is shown in Table I. All students agreed that the knowledge and problem-solving skills gained from this course would be helpful on their APPE rotations. A total of 11 out of the 12 students self-reported that the online in-class case format utilising EHR simulation technology improved their problem-solving skills, with one student disagreeing. All students self-reported that their ability to formulate an evidence-based, patient specific pharmacotherapeutic plan had improved, along with their interest in critical care. When asked if EHR simulation technology should be incorporated into other courses in the pharmacy curriculum, nine out of the 12 students agreed, one neutral, and two disagreed.

To the authors' knowledge, this is the first assessment discussing the implementation of online EHR patient simulations into a critical care elective course in the pharmacy curriculum. However, several limitations need to be addressed. First, this course was only offered to 12 students out of a class size of about 200 students due to limited resources available. Second, the combination of online patient case simulations and the use of high-

fidelity patient simulations (SimMan) would render an environment that is the closest to matching real-life clinical practice. Although live, hands-on patient simulation exercises have demonstrated improvements in critical-thinking skills in acute care electives, utilisation of online EHR patient simulations may be an alternative for institutions without these capabilities and resources (Seybert & Kane-Gill, 2011; Seybert *et al.*, 2012). Finally, other functions of the EHR simulation technology including documentation and order verification could have been utilised more to engage students further into the pharmacist patient care process. Despite these limitations online EHR patient case simulations enables instructors to harbour meaningful discussions and allows students to explore alternate solutions to complex cases.

**Table I: Critical care elective post-course survey (N=12)**

Questions	SA (%)	A (%)	N (%)	D (%)	SD (%)
The knowledge gained from this course will be helpful for advanced pharmacy practice experiences	12 (100)	0 (0)	0 (0)	0 (0)	0 (0)
The lecture format of this course improved my problem-solving skills	11 (91.7)	1 (8.3)	0 (0)	0 (0)	0 (0)
The online in-class case format utilising EHR Go! Technology improved my problem-solving skills	8 (66.7)	3 (25)	0 (0)	1 (8.3)	0 (0)
The problem-solving skills developed in this course will be helpful for advanced pharmacy practice experiences	12 (100)	0 (0)	0 (0)	0 (0)	0 (0)
After completing this course, I believe that my ability to identify and prioritise problems on a patient case have improved	12 (100)	0 (0)	0 (0)	0 (0)	0 (0)
After completing this course, I believe that my ability to format an evidence-based, patient specific pharmacotherapeutic plan has improved	11 (91.7)	1 (8.3)	0 (0)	0 (0)	0 (0)
The online patient simulator (EHR Go! technology) should be incorporated into other courses in the pharmacy curriculum	5 (41.7)	4 (33.3)	1 (8.3)	1 (8.3)	1 (8.3)
This course increased my interest in critical care	12 (100)	0 (0)	0 (0)	0 (0)	0 (0)
The faculty's expectations for this course were reasonable	11 (91.7)	1 (8.3)	0 (0)	0 (0)	0 (0)

SA=Strongly Agree; A=Agree; N=Neutral; D=Disagree; SD=Disagree

### Future Plans

The innovative elective course using EHR patient simulations may help students prepare for their APPE rotations. In the upcoming spring semester (2019), LIU plan on offering a critical care elective course that utilises the high-fidelity human patient simulator (HPS) SimMan along with EHR Go!. The authors hope to further investigate how simulation-based learning in the pharmacy curriculum (EHR and high-fidelity simulations) impact problem-solving skills.

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