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Short Communication

An Escape Room as a Simulation Teaching Strategy

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KEYWORDS
escape room;
serious gaming;
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immersive learning;
teaching strategy;
simulation

Abstract
Background: This teaching project describes the process of creating, implementing, and appraising the use of escape room concepts within a urosepsis high-fidelity simulation scenario.
Method: Instead of a locked room, Breakout EDU locked boxes were incorporated into a clinical simulation. Nursing students applied concepts learned in class and analyzed patient data to obtain clues. These clues helped determine the combination to four locks and progress through the simulation within 60 minutes. After completing the escape room simulation, each group had an opportunity to gather for a team photo, which they posted on social media.
Results: Students reported the escape game contributed to their learning and improved their ability to delegate tasks and work as a team. Preliminary observations reveal that "time" may be a significant factor associated with this teaching strategy.
Conclusion: The concept of an escape room or serious game-based learning was found to be an engaging teaching strategy by faculty and students.

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There is a need to continue to create innovative, non-digital, and cost-effective teaching strategies that can be merged with simulation experiences (Cantrell, Franklin, Leighton, & Carlson, 2017). Data collected by the National League for Nursing during the Biennial Survey of Schoools of Nursing in 2015-2016, 2016 found that only 12.6% of students enrolled in a baccalaureate nursing program were over the age of 30 years. According to Erlam (2014), millennial students are strongly connected to technology, such as gaming and ''escape rooms.'' Escape rooms are considered immersive learning environments, which promote learning through teamwork and problem solving. While traditional escape rooms incorporate a locked room, locked boxes, such as those created by Breakout EDU, are used in academic settings. With Breakout EDU, students work together to find clues that will allow them to open boxes that are secured with

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multiple locks. To date, there is limited literature describing the process of creating escape rooms or immersive learning activities using Breakout EDU in the collegiate nursing simulation laboratory.

Key Points

- Escape games may contribute to learning and improve collaboration and delegation during simulation.
- The concept of "time" evolved as a theme associated with this immersive teaching strategy.
- Serious game-based learning is an engaging simulation teaching strategy that warrants further study.

Objective

The objective of this teaching project was to create, implement, and appraise a urosepsis simulation experience that incorporated a serious gaming teaching strategy. This study will share the steps in the process of scenario development and implementation of this innovative teaching strategy, as well as preliminary observations by simulation staff, nursing faculty, and feedback received from nursing students.

Background

Sepsis refers to the body's extreme response to an infection (Centers for Disease Control and Prevention [CDC], 2016). It is considered a medical emergency, and, without timely treatment, sepsis can rapidly cause tissue damage, organ failure, and death. Urosepsis is a sepsis with a source localized to the urinary tract. According to the CDC (2016), more than 1.5 million Americans are diagnosed with sepsis each year, and approximately 250,000 individuals die from sepsis. A high-fidelity patient simulation with elements of an escape room was designed to provide student nurses with an opportunity to care for a patient, recognize early signs and symptoms of urosepsis, and deliver effective care in a timely manner.

Escape Room

The premise of an escape room is that a group of participants come to work collaboratively using puzzles and clues involving specific objectives to "escape" from the room before they run out of time. This concept has been popular in the computer and video gaming community for years, but according to Miller (2015), it was not until 2012 that a live version made its way to the United States. The degree of technology involved in escape games varies and most offer help along the way in the form of hints or clues (Connelly, Burbach, Kennedy, & Walters, 2018). Humphrey (2017) uses the term "serious" gaming to describe the link between immersive activities such as gaming and learning in higher education.

For example, Rouse (2017) utilized Breakout EDU escape room boxes to educate history students on geography and chronological historical events. Instead of escaping from a room, students must break into a box secured with multiple locks. Rouse's research on gaming in the classroom revealed the usefulness of collaborative type gaming as it increased social skills, as well as increased participants' desire to learn. It was found that serious gaming, such as educational escape room scenarios, has the potential to engage learners and enhance teamwork, collaboration, and critical thinking.

Eukel and FrenzalCernusca (2017) and Hermanns et al. (2018) utilized an escape room to enhance pharmacology education. The diabetic escape room created by Eukel et al. was modeled after a traditional escape room, including a locked room, diabetes-related puzzles, set rules, and a preset timer. Pharmacy students were given the opportunity to apply classroom knowledge to "free" themselves from the locked room. The review of student surveys showed significant increased knowledge of diabetes management and a positive perception of overall value by student participants. Similarly, Adams, Burger, Crawford, & Setter (2018) incorporated 10 educational objectives from nurse residency seminars into an escape room scenario and found that new graduates and experienced nurses perceived the experience as beneficial to their learning. These studies support the use of immersive learning formats, such as Breakout EDU escape room elements, to train health professionals about health topics and to reinforce didactic content. However, there were no studies incorporating escape room elements or utilizing Breakout EDU into the nursing simulation laboratory.

Method

After reviewing nursing curriculum and identifying a learning need for a renal simulation, it was determined that a Breakout EDU escape room teaching strategy could be implemented in the simulation laboratory to meet this learning need (Levy, Evans, & Rhodes, 2018). The International Nursing Association for Clinical Simulation and Learning (INACSL) standards served as the simulation framework (Sittner et al., 2015). The Agency for Healthcare Research and Quality (AHRQ 2016) definition of simulation as an "educational technique that augments real experiences with guided experiences in a fully interactive manner" was utilized (p. 34). Mutual respect and professional behavior, a key element of INASCL Standard II, was maintained throughout the simulation experience (Sittner, et al., 2015).

The scenario purpose, goal, student learning outcome(s), and teaching plan were created (see Table 1). A class

Table 1 Urosepsis Purpose, Goal, Objectives, Scenario, and "Escape Room" Clues

Case Scenario and Control Settings for 84-Year-Old Ellen Marks (DOB 1/8/1934) Admitted to the University Medical Center

Purpose: To assess, evaluate, and care for a newly admitted gynecological patient who exhibits signs and symptoms of sepsis.

Goal: For learners to demonstrate effective assessment skills and provide safe and accurate interventions related to the patient's early sepsis assessment findings.

Learning objectives:

Learners will work in groups to

- perform an admission assessment and provide effective care based on the assessment findings,
- carry out admission orders,
- reassess the patient, evaluate laboratory findings, and intervene quickly appropriately.

Prebriefing:

Objectives were discussed and reviewed. A tour of the simulation care environment was completed in the same manner for each simulation group. The tour included clear expectations of the high-fidelity simulator, technology for vital sign monitoring, method of collaboration with provider and necessary interdisciplinary team members, patient care supply area, patient medication station, and expectations of realism during the simulation experience. Students were instructed appropriate patient care was required in order to obtain clues and progress through the simulation. One "HINT" card that could be used to guide the students in the right direction if the student's knowledge sharing was not enough to continue the care of the patient. The students were lastly introduced to the timer that was displayed on the projector screen. Facilitators offering the tour for the students remained consistent throughout all the simulations.

Bedside shift report scenario	**Mrs. Marks, past medical history:** Mrs. Marks has been admitted through the ED with diagnosis of fever and confusion. She is 1 week status after laparoscopically assisted vaginal hysterectomy (LAVH) and anterior and posterior (A&P) vaginal wall repair. Mrs. Marks was hospitalized overnight and then discharged home with a Foley catheter. She kept the Foley catheter until post op day 3. The catheter was removed at the surgeons' office where she was educated on urinary and post op precautions. **Social history:** Mrs. Marks lives at home with her 88-year-old husband. Both are active in their church and community. **History of present illness:** Her husband reports that she "hasn't made sense since her fever started yesterday afternoon. He reports that she has "smelled of urine" which is very unlike her as she is very "prim and proper." Mr. Marks reports that his wife has been confused all night causing him to call an ambulance to bring her to the hospital. Weight 106#
State 1 control settings for simulation operator	**Mrs. Marks, objective/assessment findings:** The patient demonstrates the following vital signs and assessment findings: BP 130/90, R 30, Sp02 91%, P 106, Temp 102 (38.8 degree Celsius) Lungs are clear, tachycardia, normal bowel sounds, abdominal tenderness over bladder, smells of odorous urine, and flushed skin. She is alert and oriented to person only and exhibits confused speech randomly and when asked questions. **Learners:** The learners should perform an admission assessment and carry out admission orders. Learners should administer O_2 by nasal cannula initially at 2 L/min, start Foley, and IV. The learners may call provider for antipyretic or use cool cloths. Urine is noted to be amber in color when Foley is placed. **Health care provider orders include:** VS every 4 hours, continuous SpO_2 monitoring May administer oxygen as needed to keep oxygen saturation greater than 92% Place Foley and obtaining UA C&S Start IV and administer LR 500 ml bolus. Labs: CBC, CMP, Lactic Acid **First code:** Admitting patient to room 478. The room number unlocked the first box on the patient's bedside table where the black light is found, which is utilized for recognizing an additional clue.
State 2 control settings for simulation operator	**Mrs. Marks:** The patient now demonstrates the following vital signs: BP 140/94, R 34, Sp02 89%, P 110, Temp 102.6 The patient now sounds more breathless and her confusion has increased. Send Lab results!!! **Learners:** The learners should reassess the patient, evaluate laboratory findings, and notify the provider. The learners should recognize the possibility of sepsis.

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Table 1 (*continued*)

Case Scenario and Control Settings for 84-Year-Old Ellen Marks (DOB 1/8/1934) Admitted to the University Medical Center	
	The learner should use personal protective equipment, initiate contact precautions, and notify Infection Control (ext. 4232). Learner will receive order for clindamycin 900 mg intravenous piggyback now and every 8 hours and write ABX orders correctly. Learner will discern between po and IV abx treatment. **Second and third codes**: Learners will use the black light to reveal invisible ink arrows on the results of urine culture (down, down, right, down, right). These arrows correlate to sensitivities and resistances of antibiotics. There is a numerical clue in the personal protective equipment drawer, which is located on a paper copy of the Infection Control Policy also the phone extension to Infection Control. These codes will remove two of the three locks on the large locked box.
State 3 control settings for simulation operator	**Mrs. Marks:** The patient now demonstrates the following vital signs: BP 138/88, R 34, Sp02 93%, P 104, Temp 101.6 The patient is still confused and febrile. She complains of flank pain. **Learners:** The learner will contact pharmacy for antibiotic (abx). The learner will correctly administer ordered abx by checking the patients' armband (REMXG). **Final code**: This clue is revealed at the point of medication administration. The patients' armband contains the code to remove the final lock. The locked box contained candy and signs that read "We Did It," We Escaped," and "We Broke Out". The students were allowed to take a group picture and post it to the colleges' social media page.
Debriefing	The debriefing process used a review of the simulation objectives along with Breakout EDU debriefing cards. One card was selected by each student and the student would read the card out loud and answer the question. Students contributed their personal learnings and experiences when answering the questions.

lecture consisting of renal pathophysiology content, clinical manifestations of renal dysfunction, as well as complications and treatment of urinary tract infections and sepsis preceded the simulation experience. Needs of special populations, such as geriatric patients, were reviewed during class time. Student nursing skills required to carry out nursing actions included calling the health care provider and seeking appropriate orders. Additional nursing skills included insertion of a Foley catheter, starting an intravenous catheter, and administration of appropriate medications. Students were also required to know how to interpret laboratory results. Prebriefing and debriefing transpired per INACSL standards.

Breakout EDU Locked Box 1

While a traditional escape room has a ''locked room,'' this was not part of the simulation. Instead, two Breakout EDU (n.d.) boxes were used to simulate escape room elements. The Breakout EDU boxes were incorporated into the clinical simulation as part of routine care of a patient. Students applied what was learned in class and analyzed the patient's health history, subjective and objective physical examination findings, and laboratory results to obtain clues. These clues helped determine the combination to a lock and progress through the simulation.

The first box was placed on the patient's bedside table and could be opened with the patient's three-digit room number. Inside the box was a black light, which allowed students to recognize the next clue in the simulation scenario as they worked as a team to care for the patient.

Breakout EDU Locked Box 2

The second box was secured with three separate locks and was placed at the nurse's station. For the first lock, student nurses were required to evaluate the patient's urine culture and sensitivity report to determine the medications that would effectively treat the patient's urinary tract infection. Students used the black light obtained from the first locked box to illuminate the clues, which were written in invisible ink next to each appropriate medication listed in the sensitivity report. The next expected nursing action was to call the health care provider to obtain orders.

Because the sensitivity report revealed an infection control issue, students were required to don personal protective equipment. A copy of the infection control policy was placed in the personal protective equipment drawer. The combination to the second lock consisted of the four-digit telephone extension number for the infection control department. The final clue was located on the patient's armband at the point of medication administration. Students were then able to use the clue to open the last lock on the box, thus concluding the escape room scenario.

The time clock was shown via projector onto a screen, which was visible to both students and facilitators throughout

the simulation. On completion of the scenario, each group documented the time remaining on the time clock on a white board for peers to see. After completing the escape room simulation, each group was offered an opportunity to gather for a team photo, which could be posted on social media.

Results

The university institutional review board approved the study, which met the criteria for exemption. A total of 33 level III baccalaureate-nursing students participated in the required clinical simulation experience. There were five clinical groups consisting of six to eight students per group. Because escape room gaming activities require everyone to participate, there were no students assigned to the role of ''observing.'' All groups completed the scenario within the allotted time of 60 minutes.

An electronic survey was e-mailed to students at the completion of clinical experiences. Participation in the study was voluntary and anonymous. A link to an electronic questionnaire, consisting of 12 agree/disagree questions and two open-ended questions, was distributed to participants via e-mail. Nine of 33 students ($n = 9$) completed the survey. Of the nine participants, only four reported having previously participated in a traditional escape room game. All nine participants agreed that the escape room simulation increased their ability to think critically while caring for a patient with urosepsis. Participants unanimously agreed that the simulation contributed to their learning, improved their ability to delegate tasks, and to work as a team. Eight participants agreed that the competitive aspect of the escape room scenario was reflective of real nursing situations.

When asked to describe the best aspect of the escape room experience, one student reported, ''It forces close teamwork.'' Another student shared ''It helps with time management and delegation while practicing skills.'' ''It makes you act faster than in a normal situation, because you know where the time clock is.'' According to one participant, the time clock appeared to ''mirror real life situations.'' When asked what they liked least about the escape room simulation, three students responded, ''There was nothing I did not like about it.'' Posting a group picture on social media was important to seven of the participants. The small sample size of this study is a considerable limitation.

It's About "Time"

Two nursing faculty and one simulation staff member met to analyze the challenges and benefits of the activity. The concept of ''time'' evolved from our discussions as the most consistent theme throughout the scenario. For example, urosepsis is a medical emergency that requires timely assessments and effective management by nursing staff. Aligning the scenario to INACSL standards and creating the scenario and control settings was time consuming. Seven participants found the timer to be beneficial to their learning and agreed that the timer improved their ability to delegate tasks related to caring for the patient. Eight participants agreed that the timer helped keep them focused on providing care to the patient. Because the goal of an escape room is to have the most time left on the countdown clock, faculty considered the possibility that competing ''teams'' or clinical groups may be hesitant to share information about the patient, simulation, or escape room clues with another group. The timer may also simulate real-world time constraints associated with patient care.

Recommendations

It is not known how time constraints contribute to patient care and safety. Further research is needed to determine if there is a correlation between time on task, team performance, leadership, and delegation skills, and communication skills are needed. Preparing nursing students for high-acuity patient care, a deeper level of critical thinking, improved time management, teamwork, and professionalism are behaviors and outcomes associated with effective simulation experiences (Bauman & Wolfenstein, 2013). It is believed that serious immersive educational gaming may promote these core competencies. Interestingly, Schaffhauser (2017) found that Breakout EDU ''escape room'' boxes provide opportunities for teachers to gain a better understanding of how their students think. Schaffhauser found that students who had been through an ''escape room'' experience know how to keep their eyes open for something out of the ordinary, which is an essential nursing skill. While this project provided faculty and staff an opportunity to become familiar and confident with Breakout EDU escape room elements, it has motivated us to perform rigorous research on the topic. The next step is to perform simulation-based observational research and use the simulation-based research extensions as reported by Cheng et al. (2016).

Conclusion

According to student feedback and observations by faculty and the simulation facilitator, our escape room simulation experience was an engaging teaching strategy. Future research should include further analysis of students' experiences with immersive learning activities in the simulation laboratory. Given that there is limited research on serious gaming in nursing simulation, there is a potential to gain much information about the development of key nursing competencies, such as delegation, teamwork, and collaboration, with this type of teaching strategy.

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