Research Article

Code Sepsis: Using an Escape Room as a Creative Teaching Strategy to Engage Nursing Students in Learning Diagnosis and Interventions in Sepsis Care Management

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Abstract

Objective: To engage students in a flipped classroom activity utilizing an escape room to teach the importance of systemic inflammatory response syndrome criteria recognition, sepsis diagnostics, the anticipation of medical doctor orders, and the implementation of nursing interventions for the care of a sepsis patient. To escape the room, students must work together to answer a series of questions to solve all of the puzzles and open the locks.

Methods: A total of 32 fourth-semester students over three semesters participated in the sepsis escape room. Groups were randomly assigned as students came into the simulation room. Students were oriented to the room, given the objectives of the activity, and provided a patient scenario to start the escape room. During the activity, students completed a variety of math equations, puzzles, and advanced nursing skills to progress through the room. Students were timed while completing these activities; the goal, to escape the room in less than an hour.

Results: Students were actively engaged and involved in the escape room learning activity. All groups completed the sepsis escape room under one hour. After the escape room, a debrief was conducted, and a survey was given to all the students. Survey results and discussion revealed that the escape room was a more meaningful and engaging learning activtity for new material versus traditional lecture.

Conclusion: The escape room is a valuable learning activity to teach sepsis diagnosis and treatment for fourth-semester nursing students. The application of an escape room could be modified and used for any level of nursing student or any disease process.

Keywords: sepsis education, escape room, flipped classroom, engaged learning activity

1 INTRODUCTION

Sepsis is widely prevalent in nursing practice and is the "leading cause of death in US hospitals"[1]. While sepsis recognition follows basic assessment and prioritization skills (interpretation of altered vital signs and laboratory values), associate degree nursing students often receive very little critical care education within traditional nursing education. Couple that with a low exposure to critically ill patients while attending clinicals in rural critical access community hospitals, students lack the critical thinking to care for such complex patients.

The intent of the study was to find an innovative way to teach and engage students in complex material. As with any area of education, nursing education requires innovation and creativity to engage a new generation of students to teach and reinforce material. Gone are the days of traditional soapbox-style instructor led lectures. Faculty must utilize a plethora of teaching strategies to engage all learning styles and keep students focused on the abundance of nursing material presented each semester. Using an interactive escape room, "flips the classroom" and allows students to work as a team to challenge their critical thinking and skills in a safe environment while allowing for healthy competition amongst peers[1-3]. Considering the magnitude of sepsis and the knowledge base required in the theory course, sepsis seemed like a logical and interesting topic to build an escape room to enhance the student's learning.

2 METHODS

2.1 Creating the Sepsis Escape Room Activity

Instructors started by reviewing current methods of traditional nursing education. Prior to the sepsis escape room conception, instructors at Northwood Technical College utilized traditional lecture-based, teacher-centred, methods of instruction. To further understand the best methods of instruction, a narrative literature review was completed using Google Scholar and CINAHL (nursing education search engine) on the use of escape rooms in nursing education to gauge the importance of alternative approaches to standard lecture delivery methods.

Evidence shows that when students are engaged in the material (specifically hands on learning), they are more successful in retaining information learned and applying it to patient care scenarios, especially when the activity is student-centered[2]. Considering the age and demographics of the participants in the study, we as educators realized the importance of meeting the ever-changing needs of the students by creating an interactive way to teach a complex lesion plan. Once the educational method relevance was established, the course student learning outcomes were assessed, and a topic of clinical importance was chosen (shock and sepsis).

To build the simulation escape room, the nursing program

student learning outcomes were reviewed to create goals for the escape room activities. Activities were created after consulting program textbooks and nursing standing order sets from the local clinical facility (See Table 1). Once the "orders were created" activities utilizing math, nursing skills, and nursing interventions were created.

After the activities were completed, the flow of the room was created (see Appendix for step-by-step instructions and supplies list). Supplies were then gathered and set up in the simulation room on campus. Once all the stations were set up, faculty instructors gave it a trial run before allowing students to complete it.

2.2 Nursing Student Participants

Participants of the escape room included 32 fourth semester associate degree nursing students from Northwood Technical College in New Richmond, WI over the course of five semesters of education. Students ranged in age from 20-60 years old, all Caucasian, 3 males and 29 females.

2.3 Flow of the Escape Room

The escape room started by reviewing and analysing an instructor developed case study about a patient with sepsis. From there, the students completed a physical puzzle which guided them to follow the nursing process and begin assessing their patient. Upon correct prioritization of patient care (students had to put orders in rank of priority 1-4), the students were able to open their first numerical lock. At this point, the students should have completed a focused assessment and gathered a full set of vital signs. Once the vital signs were collected, the students should have recognized that the patient had multiple elevated vital signs triggering the systemic inflammatory response syndrome SIRS criteria. From there, the total of the vital signs (See Appendix for instructions) opened the second numerical lock.

Upon opening the second lock, the students found a flash drive. The flash drive had multiple documents containing sepsis information. Some were distractors and others offered nursing standing and MD orders. As the students worked through the standing orders, they needed to complete advanced nursing skills by starting an IV and drawing labs. The students were informed that the key to sepsis diagnosis is "in the lactate" where they found a metal key in a cup of ice which opened lock number three.

To solve the remaining puzzles, the students completed math calculations for antibiotic and fluid administration. The students also completed a cipher type puzzle to answer questions about what type of IV vs central lines should be used for the fluids, antibiotics, and vasopressors.

2.4 "Code Sepsis" Escape Room

On the day of the escape room challenge, students were randomly assigned to groups as they entered the simulation

Table 1. Examples of Activities as They Correspond with Student Learning Outcomes

Student Learning Outcome	Skill/Activity in Escape Room
Apply principles of evidence-based practice when using the nursing process while caring for a patient with critical life-threatening situations.	Case study interpretation. Recognition of systemic inflammatory response syndrome (SIRS) criteria (See Appendix) during vital signs and assessment, utilizing 3hr Sepsis Bundle (See Appendix) for interventions and treatment.
Describe the pathophysiology, etiology, and clinical manifestations of patients experiencing critical life-threatening situations.	Case study interpretation. Recognition of SIRS criteria during vital signs and assessment.
Explain procedures used to screen, diagnose, and treat patients experiencing critical life-threatening situations.	Case study interpretation. Recognition of SIRS criteria during vital signs and assessment, utilization of nursing standing orders (See Appendix), Intravenous (IV) skills, lab collection to diagnose sepsis, following medical doctor (MD) orders utilizing 3hr Sepsis Bundle for treatment and interventions.
Integrate pharmacological therapy in the care of patients experiencing critical life-threatening situations.	Utilization of nursing standing orders, following MD orders utilizing 3hr Sepsis Bundle for treatment and interventions. Puzzles related to fluid and antibiotic use. Math calculations related to IV antibiotic and fluid dosing.

room. Students were then oriented to the simulation room including the simulation mannequin and the supplies around the room (IV pumps, basic supplies, vital signs machines, lab draw kids, etc.). Once the students got a tour of the room, they were given an explanation of the scenario and were presented with the case. The students were informed they would have to solve a series of problems to unlock a box. They were also told that after each problem was solved, they would receive information to help them with their next task. The box had six locks on it and each lock corresponded to an activity. If students had questions, they were able to ask questions to receive hints; however, each question asked added 30 seconds to their final time. Lastly, the students were given 60min to "escape the room". (See Figure 1 for detailed instructions. Figures 2-6 are pictures from around the room)

2.5 Debriefing

Studies have shown through nursing educational reviews that debriefing is a pivotal part of nursing education and offers time for reflection so the students can think about what transpired during the activity[4]. After the escape room challenge, the students and instructor debriefed about the experience. The instructor allowed 15min for the students to reflect and write down notes about the day as the students completed a formal evaluation and reflection after the activity as an assignment. During the debrief, the instructors asked the students to share their feelings, thoughts, and perspectives about the experience, allowing the students to guide the discussion.

Throughout the debriefing, the students shared comments like:
- "Best learning experience ever"
- "I learned so much more by participating in this activity than I ever do in traditional lecture"
- "This made learning fun"
- "I learned a lot about myself and classmates, especially under pressure"
- "Not as stressful as simulation"

- "Really fun, do it every semester"

After the students shared their thoughts, the instructor asked planned questions to allow for further reflection of the topic, learning outcomes, and to deepen the discussion. Questions were based on topics such as pathophysiology, diagnosis, nursing interventions, and treatment. The goal of the discussion was to summarize their learning and help the students apply what they learned to clinical practice.

3 RESULTS

The nursing school Program Director required a post-activity questionnaire to gauge the effectiveness of the activity and the results of the escape room were overwhelmingly positive (See Table 2).The survey was created specifically for this escape room activity. The questions created for the survey assessed learning styles of the student, asked about student enjoyment of the activity, if the activity met the student's learning needs, and if the activity was a valuable tool in the curriculum plan for the nursing program.

While analyzing the survey data, students stated all three learning styles (visual, auditory, kinesthetic) were addressed and accommodated during the activities and everyone was able to learn something. Students also shared that because the activity was timed, it forced the students to work together quickly by enhancing communication amongst team members and critically thinking about all the components of the tasks. As faculty, we observed actively engaged nursing students throughout the entire activity. Students were excited to work together, and many showed a competitive spirit while solving the escape room puzzles. During the debrief, students were enthusiastic about the method of learning and discussed how this format was superior to traditional lecture and a majority of the students surveyed thought this activity was meaningful and a valuable tool to enhance theory content.

After the debrief was completed, the students were tasked with writing a more detailed reflection and submitting their

Sepsis Escape Room Instructions

- Assign pre-work for students to review pathophysiology, diagnosis, interventions, treatment, and nursing considerations surrounding escape room topic.
- Randomly assign students in groups of four.
- Orient students to room, mannequin, supplies, etc.
- Review objectives of the activity.
- Explain the expectations of the students during the activity and the flow of the room. The expectation is that the students will escape the room in an hour or less.
- Provide the patient case study to start the activity.
- Start timing the students when they begin the first puzzle.
- Observe the students as they move through the puzzles.
- Provide hints and answer questions as they come up. Explain that help from the facilitator will add 30 seconds to their final time.
- When the students escape the room, take their photo with their final time so they can compare and compete with their peers.
- Allow all groups to complete the activity.
- Allow the students 15-20min post activity to reflect and take notes about the experience.
- Conduct the debrief allowing the students to guide the discussion. Then review objectives and use questions to deepen discussion.
- Provide students the post activity survey and collect before they leave.
- Assign reflection and post work and assign the due date.

Figure 1. Escape room instructions.
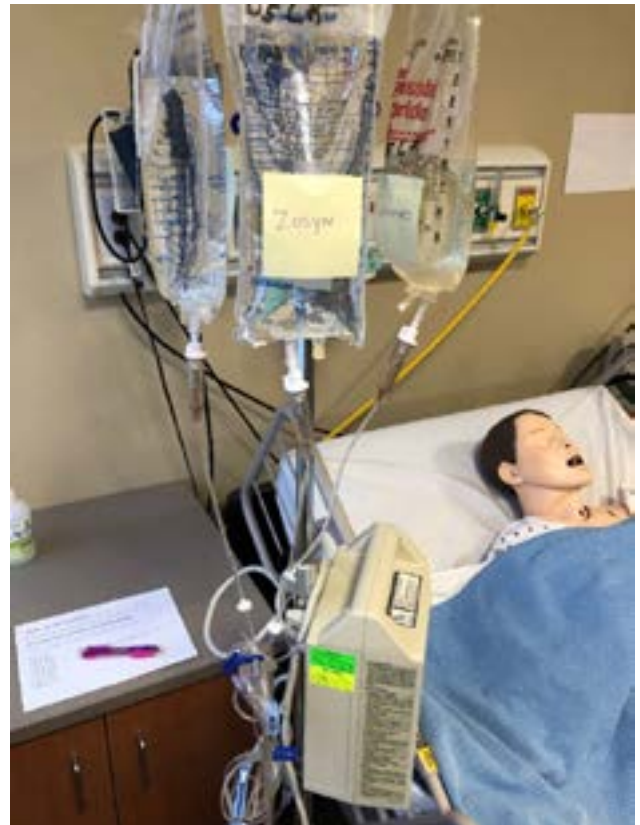

Figure 2. Simulation mannequin and supplies set up.

Figure 3. Sepsis treatment puzzles.

Figure 4. Lock box for all activities. Students must open to "escape the room".

Figure 5. Simulation mannequin with vital signs data for students to identify SIRS criteria.
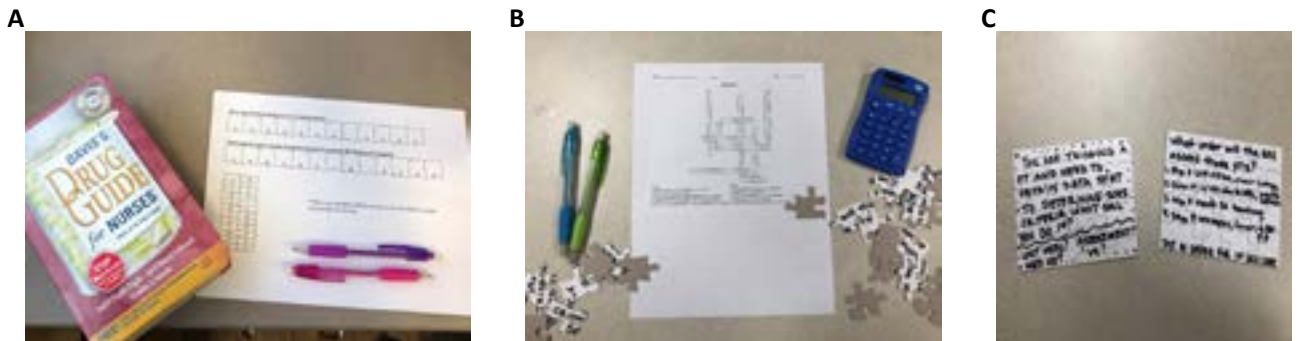
A

B

C

Figure 6. Example of a puzzle.

pre-work on the sepsis workup for their learning plan grade. Based on the results of the questionnaire and post-debrief discussion, the activity proved to be valid and reliable with the intent to repeat the activity in future semesters.

4 DISCUSSIONS

The students surveyed in this group were fourth semester senior level students, ready for nursing school graduation. While this escape room was geared towards the advanced nursing student, the concept of an escape room could be utilized throughout the nursing program at varying levels of difficulty. Educators could easily modify the escape room and simplify the puzzles for the novice nursing student by focusing on basic concepts. The escape room design could also be modified to cover any topic or nursing skill.

The use of innovative teaching strategies and a flipped classroom has become increasingly popular in education, especially nursing education over the past decade. Institutions and educators are realizing that they must alter their teaching methods to meet the needs of the technology driven and non-traditional student. Utilizing non-traditional methods of education can engage students in the often, foundational nursing education[5,6]. Escape rooms have become a novelty in social entertainment and with that novelty come excitement and competitive spirit amongst the activity's participants. This study proved to provide the same level of excitement amongst its participants and further supports the current research that centers around the importance of student-driven education.

Table 2. Sepsis Survey Results Post Activity

Post Escape Room Survey Questions	Response Rate (*n*=32)
I enjoyed the escape room activity.	5.00
I found this game fun to play.	4.53
This activity increased my interest in the lecture content.	4.21
The challenges of the game were interesting.	4.37
This activity increased my knowledge of the lecture material.	5.00
This format of learning helped me retain the new material.	4.53
The escape room encouraged teamwork.	4.21
The escape room encouraged the use of communication skills.	4.21
This is a valuable activity for 4th semester students. The level is applicable to this semester and worth doing again.	5.00
The escape room met my learning needs. State learning style.	5.00
The pre-work and reflection support the knowledge gained from the activity.	4.37

Notes: Response rate 100% (n=32). Answers were graded 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), 5 (strongly agree). Averages of responses are shown in the table below.

4.1 Study Limitations

There is limited research on the benefits of escape rooms in nursing education, however, momentum is growing over the use of innovative teaching strategies in the classroom. Specific to this study, this escape room has been an active learning strategy for five semesters and has only been used by 32 students. This activity will continue to be used, but for now, it is a small sample size.

5 CONCLUSION

Findings support nursing research that highlights the importance of engaging learning activities and the positive impact of escape rooms in nursing education to challenge critical thinking while offering a student-centered approach to nursing education. As found, the escape room allowed the students to learn and master the course competencies regarding sepsis assessment, diagnosis, planning, interventions, and evaluation. The beauty of creating an escape room is that it can be altered and applied to any level nursing student and any learning content area with the goal of focusing on nursing care, communication, teamwork, and collaboration.

Conflicts of Interest

The authors declared no conflict of interest.

Author Contribution

Raiolo E developed the escape room, debriefing survey, evaluated the survey data, and co-authoredthe manuscript. Steen A co-authored the manuscript.

Abbreviation List

IV, Intravenous
MD, Medical doctor
n, Number of participants
SIRS, Systemic inflammatory response syndrome

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