DESIGNING ESCAPE ROOMS FOR STRESS REDUCTION IN NURSING STUDENTS

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INTRODUCTION

Most professional preparation programs, and particularly those considered apprenticeships, focus on giving students supervised experiences in future work situations (Hasson, McKenna, & Keeney, 2013). For instance, future teachers are given opportunities to observe and practice teaching prior to graduating and becoming a licensed instructor. In many of those preparation programs, simulations have become commonplace for more effectively engaging students. Simulations are used in order to give students more practice than they might have in the real world. They provide opportunities to explore complex concepts and ideas difficult to visualize (Ferdig et al., 2015). They are also offered to students to provide opportunities to engage with people they might not see in their apprenticeship experiences but would later see in their future job. Finally, simulations are used when the learning scenarios are considered dangerous (e.g., flying a plane or working with a live patient; Lok et al., 2006).

An obvious intended outcome is to attain knowledge, attitudes,

and skills students will need in future work scenarios. However, a second intended outcome is to gain enough experience to begin to reduce stress and anxiety about the content area or workplace environment (Szpak & Kameg, 2013). Ironically, the more real a simulation seems (and the more students are immersed), the more anxiety students are likely to feel, potentially reducing their success or learning in the simulation (Nielsen & Harder, 2013). Faculty in multiple preparation programs now find themselves working to reduce anxiety caused by engagement with simulations.

The purpose of this study was to explore an innovative method by which to reduce the anxiety of nursing students prior to engaging in a simulation. The innovation was focused on the relatively recent popularity of the *escape room*. An escape room was built and implemented in a nursing class where simulations were used. Results of the implementation are presented. The paper concludes with recommendations for future research and escape room design.

LITERATURE REVIEW

Nursing education and simulations

Simulation, for both instruction and assessment, is used in nursing education for several important reasons (Burbach et al., 2019). First, it can provide increased practice as students prepare to enter full-time jobs (Lok et al., 2006). Second, it can provide practice in environments that are considered safe to both the nursing student and the patient (Kolozsvari et al., 2011). Third, it has the potential to lead to improved patient care (Alexander et al., 2015). Finally, it can lead to increased acquisition of nursing skills, competencies, and behaviors (Hayden et al., 2014).

However, the use of simulation, particularly for nursing education, is not without its risks. Most notably, students in nursing simulations experience high anxiety levels (Al-Ghareeb,

Cooper, & McKenna, 2017). Anxiety in simulations can originate from "being observed, role, preparation, experience, making mistakes, receiving feedback, use of video, and psychological safety" (Yockey & Henry, 2019, p. 30). Although anxiety can actually be helpful in some situations and contexts (e.g., sports or acting; see Rycroft, 2018), too much anxiety can be negative for learning in nursing simulations. It can lead to poor performance and decreased learning, with some going so far as to suggest anxiety may "inhibit the effectiveness of simulation as an educational tool" (Al-Ghareeb et al., 2017, p. 480). Ironically, the tool created and implemented to reduce anxiety in future performance creates anxiety that prevents proper use of the innovation. This is an area where educators and researchers are calling for more theoretical and empirical attention (Burbach et al., 2019; Cantrell, Meyer, & Mosack, 2017).

Researchers have attempted to respond to this call, focusing on interventions which may reduce simulation anxiety. Relaxation techniques such as autogenic training and mental rehearsal for cognitive visualization have been researched, but results on anxiety levels have been mixed (Holland et al., 2017; Ignatio et al., 2016, Ignatio et. al., 2017). Mills et al. (2016) researched *social evaluation anxiety* and suggested reducing the number of people observing in the room as a way to alleviate student anxiety. Some other interventions studied include music (Gosselin et al., 2016), use of standardized patients (Kameg et al., 2014), and allowing the primary nurse to consult the expert during the simulation (Yockey & Henry, 2019).

While these studies show some promise, the International Nursing Association for Simulation and Clinical Learning (INASCL) guidelines (2016) discuss pre-briefing with adequate orientation to the simulation environment and learning objectives as a way to alleviate student anxiety. Additionally, game-based learning has been linked to many positive learning outcomes, and escape rooms have been linked to higher critical

thinking, motivation levels, and teamwork (Adams et al., 2018; Eukel et al., 2017; Reed, 2020). Roman et al. (2019) studied qualitative themes from an escape room among final year nursing students and found that students perceived being more relaxed than usual. Therefore, our goal was to design and create an engaging, fun escape room game that would serve as a both a pre-briefing/orientation as well as an introductory simulation experience for students during a time when they are generally highly anxious.

Escape rooms

An escape room is a live, team based game "where players discover clues, solve puzzles, and accomplish tasks in one or more rooms in order to accomplish a specific goal (usually escaping from the room) in a limited amount of time" (Nicholson, 2015, p. 1). Escape rooms have become popular in the general public (Walsh & Spence, 2018) as well as in classroom use (Nicholson, 2018).

For academic purposes, research has provided several important outcomes in student and teacher use of escape rooms. For instance, Kinio et al. (2017) used escape rooms and found students had an increased interest in their specific topic of vascular surgery. A follow-up report (Kinio et al., 2019) showed that the escape room "experience motivated (users) to prepare beforehand and believed that the experience consolidated the knowledge that they had read" (p. 134).

Perhaps the most comprehensive review to date was completed by Panagiotis Fotaris and Theodoros Mastoras in 2019. They reviewed 68 studies where escape rooms were used. The research they reviewed provided evidence that escape rooms led to increases in teamwork, collaboration, enjoyment, engagement, learning gains, motivation, social interaction, communication, critical thinking, problem-solving, creativity, and leadership. In

fairness, they also disclosed several challenges with the use of escape rooms (e.g., required time commitment, limited resources, timing issues, working with large groups, etc.) or the research on escape rooms (e.g., poor evaluation, sample size, etc.). However, they conclude that "escape rooms are innovative, active, collaborative and (have) constructivist instructional approaches that can shape learning more powerfully than conventional teaching. They help learners understand

the value of seeing problems from different perspectives, expose them to collaborative teamwork, promote engagement and persistence on task, strengthen social relationships, activate team spirit, and facilitate benefits of deep learning through group discussion" (p. 8).

Nursing escape rooms.

Given the promising reports regarding escape rooms, some nursing educators have already begun to explore the promise of escape rooms. For instance, Brown, Darby, and Coronel (2019) used *Breakout EDU* locked boxes for a clinical simulation. They suggested that the exercise was useful for students, who self-reported improved learning and the ability to work as a team. Although it was a useful activity for teachers and students, they did note time was a factor that could impact future implementations. Morrell and Ball (2018) conducted two separate escape room experiments for undergraduate nursing students. They acknowledge that their work was not a part of a research project, but also suggest that the escape room activities helped faculty assess current student understanding. Moreover, they reported that student reflection could help students self-assess and make improvements in their educational experiences. Finally, Kutzin (2019) used an escape room in a simulation center to teach about teamwork and communication. At the end of the experience, students were given a survey about their experiences. Participants mainly agreed that "the escape room allowed the

participants to work as a team, required the participants to communicate effectively, and professional health care providers (nurses, physicians, respiratory therapists, etc.) would benefit from attending an escape room event" (p. 477).

Although these studies are important and show promise, there are very few examples in nursing education of using escape rooms for the specific purpose of reducing anxiety. Therefore, the goal of this work was to design and implement an escape room to be implemented at a time when students are highly anxious—namely, the first nursing simulation that students experience using a high fidelity mannikin. Once completed and pilot tested, researchers could then use an experimental study to examine its effectiveness (Kutzin, 2019).

ESCAPE ROOM GAME DESIGN & METHODS

Participants consisted of a convenience sample of undergraduate junior-level nursing students from two clinical sections at a university in the Northeast U.S. (n=14). IRB approval was obtained, and students participated in the escape room as part of their regularly scheduled nursing lab time. Students were randomly organized into groups of four to five students within their clinical section to complete the escape room challenge. There were 3 total groups who participated. Although clinical sections usually consist of 8-10 students, simulation rooms are small and so simulations typically run with 5 or fewer students in a group to maximize participation and available space.

Students began with an orientation with nursing faculty to discuss expectations and the equipment/supplies in the room. Then, students were given the rules and objectives of the game with an initial clue that summarized the patient's medical information and plan of care. Students had up to 20 minutes as a team to solve the puzzles presented in the room, find the necessary tools, find the exit key, and escape.

Unlike a virtual or screen-based game, this live action escape room took advantage of the physical space in the nursing laboratory and players had to interact face-to-face to solve a series of problems and tasks as a group. The escape room took place in a simulation lab room that had high fidelity mannequins and a one-way glass mirror for instructor observation (see Figure 1).

Figure 1. The simulation lab room used in the study.

The room was filled with prompts, artifacts, hidden clues, and various types of lockboxes. The game narrative was based on a hospitalized patient with pneumonia who required oxygen, an IV pump, and close monitoring. Students were given a five-to-ten minute, in-room orientation with a nursing faculty member. They were told that they could call the faculty member for help one time; they were then led through the following steps to escape the room. Nursing faculty typically observe students from behind the one-way glass and take recorded notes of actions and performance issues with each group that can later be discussed with students during debriefing time. (These observations from faculty recorded notes as well as student comments during debriefing were recorded and analyzed for discussion in this paper.)

Step 1: Introduction

Students entered the room, they were given a piece of paper with specific instructions, and the timer began. Those, instructions, shown in Figure 2, contained the patient's medical information as well as overall game objectives. More importantly, the initial instructions contained information required to unlock the first lockbox.

Mr. Parkers was admitted with Pneumonia. Admitting physician is Dr. White. He has orders for a regular diet, activity ad lib, Oxygen as needed to keep SPO2 >90%, VS q4h, maintenance IV of NS with 20 meQ KCL @ 50 ml/hr, and to start Ancef 1gm IVPB q8hrs. You have 2 objectives- the ultimate objective is to find the escape key to leave the room before the timer runs out. But in order to do this, you must work together to assess and take care of the patient with the given orders. Don't escape with your group into the hallway abandoning your patient until the patient has received the necessary medication. All the supplies you need for patient care and interventions will be located in lockboxes. There are embedded clues along the way to help you to help you unlock the boxes. Once you find the key, you will need to find the final box to "escape." This box is labeled with several stickers. If you are able to "escape" before the timer buzzes, make sure to hit "stop" on the timer to save your time. We will see which group can escape in the fastest time. You may call your instructor one time for a clue if you get stuck by using the phone in the room to call the control room and a special hint will be provided. The timer will begin once you enter the escape room and you have 20 minutes to try to escape. Good luck!

Figure 2. Initial clue with student instructions

Step 2: The First Lockbox

The escape room instructions were created to help students understand that patient care and escaping were simultaneous events. As such, the first course of action for patient care should have been to obtain the patient's vital signs. A summary sheet, shown in Figure 3, was placed in a prominent position near the patient. Students who filled in the vital signs would get the code they needed to unlock the first lockbox. Inside the lockbox was a nasal canula used to supply oxygen to the patient and a written code to get into the second lockbox.

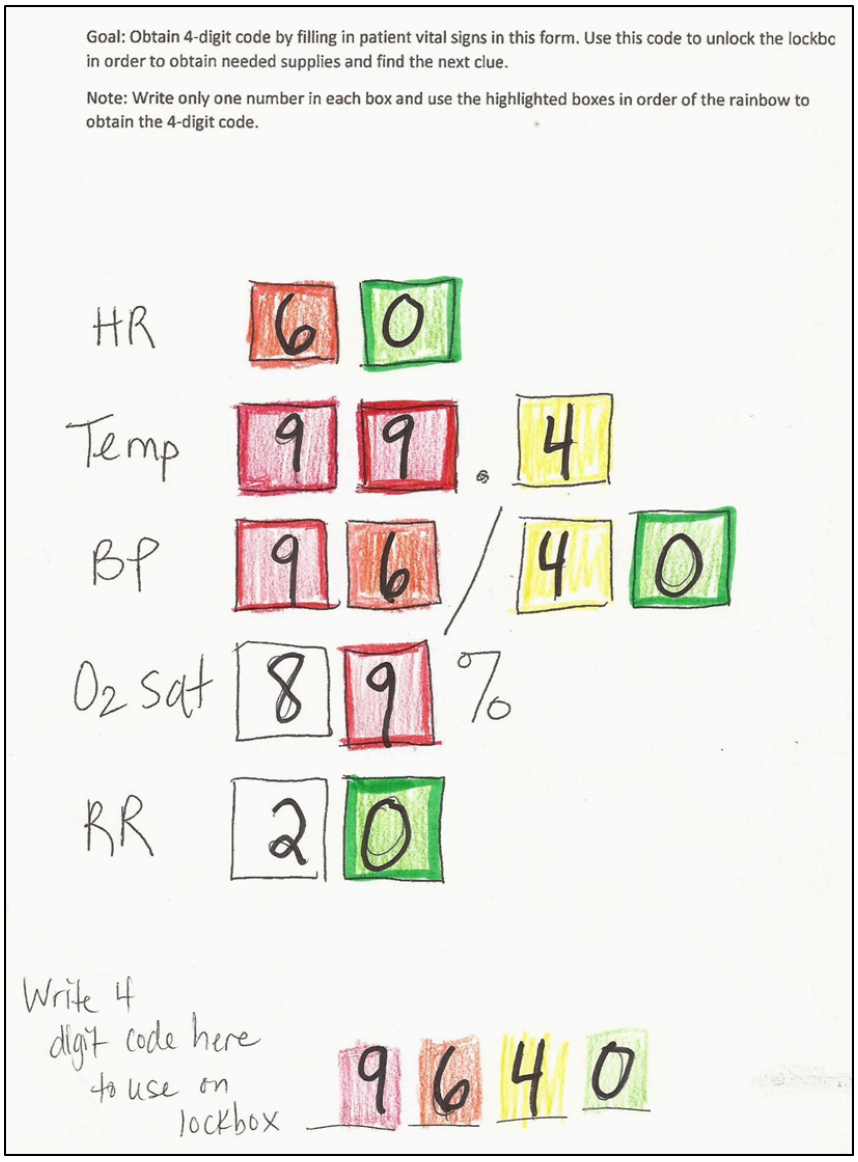

Figure 3. Code to the first lockbox as determined by taking the patient's vital signs.

Step 3: The Second Lockbox

After applying the nasal canula, students needed to search and find the second lockbox (located in the medication cart) that

could be opened using a code in the first lockbox. It contained medication (*Ancef*) that the patient was allergic to. The students should have seen the drug and gotten ready to administer it while also checking the electronic medical record (EMR) for both the order and patient allergies. They also should have checked the drug book for medication appropriate rate and dosage. Finally, they should have checked the wrist band for verification of the patient name and allergies.

Step 4: The Decision Tree

If students **correctly** completed step 3, they would have noticed a drug allergy in either the EMR or the patient wristband. They would have called the physician (the nursing faculty member behind the one-way mirror) using a phone in the simulation room. The doctor would have given them an order for new medication (*Cipro*) as well as a four-digit code to the third lockbox.

If the students **incorrectly** completed step 3, they would have failed to notice the drug allergy and would have administered *Ancef*. The patient would have had an allergic reaction with multiple symptoms. Students would have lost time having to re-assess the patient, getting new vital signs, and calling the physician. The physician would then have ordered two new medicines as well as a code to unlock the third lockbox.

Step 5: The Third Lockbox

The third lockbox contained an invisible ink flashlight as well as a written clue to check the drug book for the correct *Cipro* rate and dosage. The drug book contained a bookmark with an invisible message that said: 'Twist the heart open to find the key to the final box' (readable with the invisible ink flashlight).

Step 6: Patient Care

Given the combined need to escape while preserving patient care, one student should have then administered *Cipro* at the correct rate, while the others looked for the heart-shaped box.

Step 7: The heart-shaped box

The heart-shaped box was sitting on the patient's bedside table. Once it was found, students needed to twist it open to reveal a small key.

Step 8: Automated external defibrillator (AED)

At this point in the simulation, the patient became symptomatic with a low heart rate. Students needed to call the physician who would tell them to apply the AED pads for the low heart rate.

Step 9: Escape.

The final lockbox was located in the AED case. When they opened it to apply the AED, they would have seen the lockbox and could have opened it with the key. Inside the lockbox was a note that said: 'You have escaped. Please hit stop on the timer." Figure 4 shows the escape room materials.

Step 10: Debrief.

Once the game ended, a faculty-led debriefing session was completed according to International Nursing Association for Simulation and Clinical Learning (INASCL) guidelines (2016) using the *Debriefing for Meaningful Learning* technique. The goal was to assist students in self-reflection of their clinical skills (Dreifuerst, 2015). During this debriefing time, faculty questioned students in each group on their thinking processes and experiences during the game. Faculty were able to ask open ended questions such as "How did that go? What did you think of the game experience?" and took notes recording students'

feedback and comments from each group. During debriefing time, faculty was also able to answer questions and correct any misinformation or mistakes in nursing skills that might have been noticed during the simulation.

Figure 4. Materials used in the escape room.

RESULTS

Students were organized into 3 teams. Each team is listed below with a description of their experiences and outcomes. Two of the three groups escaped within the 20-minute time limit.

Pseudonyms are used for player names to protect privacy.

Group 1: The *Cautious* Team

Results from Group 1

Four students (three females, 1 male) students formed the *cautious team*. The instructor handed the team an envelope with the initial clue and started the timer. The team opened the envelope and slowly and cautiously read, re-read, and discussed the meaning of the clue for approximately 3 minutes. Then, one

of the female students (Katie) assigned roles to herself (assessment) and the other students (documenter at the white board, medication nurse, and vital sign collector). Katie went to the patient and began a very detailed assessment (full head-to-toe) while asking the patient questions. The other students stood watching her and listening for a few minutes. Eventually, one started collecting vital signs and the student standing at the whiteboard wrote down that data. None of the students were looking at the various lockboxes around the room or talking aloud about their ideas. They seemed confused on what to do next until eventually someone noticed the piece of paper with the vital signs chart on the medication cart. They completed it and got the code to unlock the first lock box at 7:30 into the game.

They applied the nasal canula onto the patient and got the code to find the second lockbox with the medication. Todd (the medication nurse) got ready to give the medication and went to electronic medical record (EMR). He verified the order but failed to notice the allergy. He started to give it intravenously as the others watched. None of the other students checked the allergy band on the patient.

At this point, prior to starting the medicine drip, one of the students asked Todd about the administration rate. He didn't know and the group failed to check the drug book in the room. They decided to call the instructor for a clue. They asked broadly for a clue, rather than a specific rate (what they needed to know). The instructor, seeing they were struggling (conceptually and with time) and about to make a medical error, told them to check the patients' allergies. They all realized their mistake and immediately checked patient's wristband. They held off on administering the medication and called the doctor which got them back on the correct path. They then followed normal progression of the game of giving the *Cipro*, finding the invisible ink flashlight, and using it to discover the secret message on the bookmark. The timer went off at 20 minutes right after they

had found the key in the heart shaped box; their faces sunk with disappointment. The instructor told them to keep going and they escaped at 22:40.

In debriefing, the instructor was able to clarify some of the misinformation about how to administer an IV medication and the importance of allergy verification. The students in the cautious group expressed their disappointment with their performance with statements like "I can't believe we forgot to check the allergies" and "I wish we could do it again." Comments about their experience in the debriefing time were overwhelmingly positive despite their failure to escape in time. Comments included: "This was such a cool learning experience" and "I wish we had more simulation labs like this."

Assessment of Group 1

Faculty observed several interesting things that happened in this first group which affected their performance. First, there was little group communication after Katie assigned roles to everyone, so students were functioning independently. They failed to question what others were doing. For instance, no one was paying enough attention to the clues and lockboxes around the room.

Second, Katie took a very long time to perform a full head-to-toe detailed assessment when a brief focused assessment on the respiratory system was all that was needed. It was unclear whether she did this because she thought it was tied to the game or whether she was trying to demonstrate her assessment skills to her peers and instructor. Valuable time was wasted by this group collecting irrelevant information.

Third, they failed to notice the vital signs chart in a timely manner; as such, they took a long time finding the code for the first lockbox. They wasted time getting ready to administer the medication that the patient was allergic to (that no one caught).

And, they were unsure how to administer the medication intravenously. They serendipitously called the instructor for a clue at a critical moment or their escape time would have been further delayed (and the patient may have died). All of these may have been tied to the fact that there was no ongoing leadership to provide direction to the group, outside of the initial role assignment by Katie.

Group 2: The Leaderless Team

Results from Group 2

Five female students formed the *leaderless team*. They were handed their initial clue and the timer was started. One student (Karrie) quickly, clearly, and loudly read the clue to the rest of the team. No one asked questions as they were eager to start. No roles were assigned, and students began looking around the room while a student (Marie) began to perform a detailed assessment (full head-to-toe) by asking the patient questions. The other students did not stand around watching her like the previous group had done. Instead, they all went to work examining the objects in the room and they quickly found the vital sign chart. They filled it in and got the code to unlock the first box at a time of 3:40.

Once unlocked, they found and applied the nasal canula onto the patient and got the code to find the second lockbox with the medication. Karrie went to the EMR and immediately caught the allergy. Several group members were communicating ideas aloud to others. They called the doctor and were given the new order for the *Cipro*. They quickly found the invisible ink flashlight and secret message on the bookmark. They did have a small delay when looking up the new medication in the drug book because Marie kept giving the others misinformation. For instance, she kept saying that the patient was allergic to *Cipro* as she was confusing brand and generic drug names. They also had a short

delay in finding the heart-shaped box as they were looking at the mannikin's chest for his heart instead of looking around the room. They eventually found it and were able to use the key to escape at 14:53.

In debriefing, students were happy with their performance and immediately wanted to know if they had beaten the previous group. Their comments were overwhelmingly positive. During debriefing, one student shared: "It helped me think quickly on my feet and make decisions." A second added: "I loved this far more than our other simulations."

Assessment of Group 2

Despite not having a clear leader in the group or clear roles, this group communicated well with each other (and much better than the first group). They freely shared ideas and questioned what the others were doing. This group was also much quicker than the first group in noticing details such as the allergy, the location of the vital signs chart, and seeing the lockboxes in the room. The misinformation that was being given by Marie to the rest of the group caused a hiccup in their progress, but they worked together to verify that the information Marie had provided was incorrect.

Interestingly, they were the only group which didn't use their free clue from the instructor. Students did not know why (or at least share why), but this would have allowed them to escape faster. With such a difference in timing and the increased noticing by students, we wondered if students were sharing information in the hallway. This can frequently occur in traditional simulations, limiting the amount of learning. However, the competitive nature of this group showed their unwillingness to share information because they wanted to get the best score.

Group 3: The *Focused* Team

Results from Group 3

Five students (four females and one male) formed the *focused team*. After receiving their initial clue and starting the timer, a female student (Natalie) quickly emerged as the leader. She began demonstrating leadership skills such as calling out things that needed to be done while other students responded with: "I'll do that." They all went to work assessing the patient and examining the objects in the room and discussing their findings out loud as a group. One student went to the EMR to verify information before the first lockbox was even opened. The students each organically found a role to play even though no official roles were assigned.

Natalie was particularly focused on the lockboxes and kept the rest of the group reminded about what they needed to do. They quickly got the code to unlock the first lock box at 2:32. Since they had discovered the allergy early, they didn't waste time getting ready to administer the wrong medication. They called the doctor and were given the new order for the *Cipro* and the code for the next lockbox. They found the invisible ink flashlight and immediately used it to see the secret message on the bookmark. They did have a brief delay when trying to calculate the rate for IV pump for the *Cipro* as they weren't sure how to do this. The team called the instructor for a clue about this immediately rather than wasting time discussing it. After administering the medication, they found the key and the final escape box and were able to escape in 12:46.

The instructor used debriefing to explain how to determine appropriate rates for IV medications. In debriefing, this group was ecstatic because they knew they had done well. They were even more excited when they found out they had escaped in the fastest time. One student commented: "It was fun—I still had

the adrenaline nervous feeling when I knew the patient needed the AED, but I knew the escape was near since we had the final key." Another student commented: "I'm typically a quiet person but the escape room provided me an environment where I felt comfortable communicating freely."

Assessment of Group 3

The early emergence of Natalie as the focused team leader was the driving force that enabled group three to succeed with the fastest escape room time. Natalie commented in debriefing how she loved figuring out locks and had done an escape room before, so she brought her past experience to the rest of her team. Because they checked the EMR early on, they discovered the allergy well before the other two groups. They took advantage of their free clue at an opportune moment so as not to waste time trying to figure things out themselves. They exhibited the best group delegation and communication skills with closed loop communication (students repeating what the others said for confirmation).

DISCUSSION

The escape room could arguably be considered a success for several reasons. First, the goal of the escape room was to reduce student anxiety about simulations; students were highly engaged in the activity and interested in doing this again. They even suggested to faculty in debriefing that this type of activity should replace typical simulations. The usual looks of panic and fear on students' faces was replaced with enthusiasm and smiles as they tried to figure out how to escape.

Second, in traditional nursing simulations, there are usually a few students in the group who melt into the background and do not participate due to their high anxiety levels (e.g. they become passive observers due to their stress). During this escape room, all students were actively participating and communicating.

Students had to use critical thinking and problem solving to overcome challenges, and they had to rely on others for guidance and help. These are similar skills that will be needed as future nurses working in challenging situations. Students got a taste of the expectation for teamwork and solid group communication and how important these skills are in healthcare.

A third reason to consider this a success is that the escape timeframe was created specifically to rely on the success of student teamwork and communication (skills requisite of high-quality nurses). Other nursing simulation escape rooms have used time limits of 15 minutes up to 60 minutes (Brown, Darby, & Coronel, 2019; Edwards, Boothby, & Succheralli, 2019; Morrell & Eukel, 2020;). After the first group was not able to escape within the twenty minutes allotted, this time frame was questioned. However, the timing seemed justified when the second and third groups escaped using better teamwork and communication. Future research could examine whether escape rooms could be used as tools to assess future nursing skills.

There are also several lessons learned from this experience. First, there was a game design element that was helpful in setting student expectations. They were told in the initial clue that the final lockbox would be labeled with stickers and that it would need to be opened with a key. All the previous lockboxes in the game used numeric codes, so when students eventually found the hidden key, they knew they were getting closer to escaping. This helped students understand where they were in the game progression and motivate them towards the end goal. Future escape rooms can include such designs to give students more in-game progression feedback.

A second lesson is that experience matters. Katie, in the first group, was a student who was repeating the course. She was the only one with prior simulation experience. Her past simulation performance likely led her to assign roles to the others that may

have not been necessary in the given situation. She also drew on class experience to give a longer-than-necessary, head-to-toe assessment rather than a streamlined one. Natalie, however, had previously experienced an escape room, which led her to focus on getting the lockboxes open quickly. Future research should examine how to help students recognize the complexity of new situations in nursing; it should also examine the impact of new vs. experienced simulation students and escape room players.

A third lesson relates to the timing of the initial clue given to students in the sealed envelope. Since the timer had already started when students began opening the initial clue, the reading of the clue took an extended amount of their allotted time, especially for the first group who read it slower and reread it to check understanding. For future research or practice, it may be beneficial to let each group read the initial clue and collaborate with each other for standardized amount of time (e.g., 5 minutes) before the timer is started when they enter the room. This way a group is not rewarded simply by having a fast reader, since groups differed in the amount of time spent analyzing the initial clue.

LIMITATIONS

While this study was able to demonstrate the potential value of escape rooms, there are several limitations. Those limitations can serve as important next steps for future research. First, this study was limited by the sample size. Two clinical sections with 14 total students participated. Future research could address sample size by increasing the number of students, expanding the sample to more than one college of nursing, and by adapting the experiment across multiple simulations. The former changes would obviously increase confidence in results; the latter would explore usefulness of escape rooms across simulation content areas (e.g., an end-of-life simulation vs. a cardiac simulation).

A second limitation is that the study examined what occurred

immediately during and after a simulation. Additional research should also explore the long-term transferability of potential stress reduction or improved learning when students then participate in live patient settings.

This study contained no control or other experimental group. Rather, data were used from existing studies to compare the experimental group to *business as usual*. Future studies should examine control groups as well as alternative measures of reducing stress (e.g., meditation) to determine the extent of escape room impact.

A final limitation is that this was a qualitative study intended to describe the escape room design and implementation, rather than focusing solely on student quantitative outcomes. Future research could add quantitative data like the *Creighton Competency Evaluation Instrument* (Hayden et al., 2014) to test student learning from escape room's effect on actual student performance and competency.

CONCLUSION

In this study, an escape room was designed to support stress reduction for nursing students completing simulations. Positive outcomes from this study included communication, teamwork, and self-awareness. By creating this playful space, students could take risks, problem-solve, and learn from their mistakes (Whitton, 2018). Although it was more labor intensive to design the simulation into an escape room, it was advantageous for these novice students to have an overwhelmingly positive experience for their first nursing simulation. This may help lead to higher self-efficacy and confidence for future simulation performances.

Conversely, students also displayed characteristics that delayed, detracted, and distracted. These characteristics—like failing to notice, sharing misinformation, and lacking nursing knowledge

and skills—could be deadly in real life nursing. The fact that these behaviors and attitudes appeared in the escape room gave the instructor time in debriefing (and in future sessions) to correct and improve student outcomes. In other words, the disappointment that the first group experienced from not catching the allergy and not escaping in time is actually a positive thing; it will motivate them to learn from their experiences.

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ACKNOWLEDGEMENTS

This project was supported via the EHHS Graduate Student Grant Program at Kent State University.