New Perspectives in Science Education
International Conference
NEW PERSPECTIVES in SCIENCE EDUCATION

SimScape – Integrating Novel Teaching Strategies in Medical Education

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Abstract

A shift is needed from a teacher centered to a more learner centered approach in medical education to meet the needs of our current generation [1, 2]. We have incorporated innovative opportunities for peer-group learning, in a psychologically safe environment, to enhance retention of knowledge, encourage development of leadership, empathy and teamwork skills. Escape Rooms are a team-based activity where a group completes a series of puzzles to achieve the goal of escaping. They are emerging as a popular educational tool to impart new knowledge and skills with entertainment [3]. Medical Simulation has become an integral strategy in medical education; it provides a risk-free environment to teach complex, high-risk, low-frequency events without involving human patients [5]. We created a unique experience for our 4th year medical students during their orientation to Advanced Medicine Sub-internship. They solved an Escape Room, followed by medical simulation cases using high-fidelity simulators where they responded to a rapid response call together. We received overwhelmingly positive feedback on a survey that was conducted following the orientation. Among 111 students who have participated, 100% found these sessions helpful. With reference to the Escape Room exercise, 67.9% found it very useful, 20.2% found it moderately useful, 10.1% found it slightly useful and only 1.8% did not find it useful. In terms of the Simulation, 78.9% found it very useful, 14.7% found it moderately useful, 6.4% found it slightly useful and 0% found it not useful. Given these results, we are expanding our efforts and currently a pilot study is being conducted in our internal medicine residency program using these strategies. In our experience, incorporating play will innovate medical education for new learners. However, further studies are needed for successful integration into the medical curriculum.

Keywords: *Escape Room, Medical Simulation, Medical Education, Internal Medicine, Sub-Internship*

1. Introduction

Current medical education needs doctors to be better equipped with the adult learning skills necessary to adapt and change based on the community they serve. A shift from a teacher-centered to a more learner-centered approach meets the needs of our current generation [1, 2]. Adults are usually motivated by learning that is perceived as relevant, participatory, and actively involving them [2]. As medical education is a lifelong process, a physician's learning is usually problem-focused and builds on their previous experiences. Problem-focused, seasoned doctors can take responsibility for their own learning by involving cycles of action and reflection and building on their own experience to immediately apply them in their practice. However, the medical students and young doctors are overwhelmed by the vast amount of information they need to process with little experience with clinical application. They have a short time to reflect on their activities, and a small mistake can significantly dent their confidence and mutual trust as well as respect from their patients and peers, leading to stress in their medical careers. Gamification based learning methods like a full size clinical escape rooms and problem-based learning methods like programmable simulated mannequins help young doctors provide a means of improving self-confidence, time to reflect on their actions based on feedback, master the elements of team building, and develop mutual trust and respect to their peers to solve the complex problems [3]. These innovative methods provide exposure to complex real-life stressful situations with stress and risk-free environment to enhance their teamwork skills and application and retention of medical knowledge.

2. Novel Teaching Strategies in Medical Education

Subinternship is one of the first chances for a fourth year medical student to be directly in charge of patient care, which is different from a basic medicine clerkship exposure as a third-year medical student. It provides the opportunity to learn and care for the patients in a safe, supervised, yet autonomous environment, just like someone would in their early postgraduate years. Although sub-internship is a fascinating and essential experience, it can be fairly intimidating [6]. The training takes place on general medicine services, intensive care units, or subspecialties and with the expectations of real-time application of medical knowledge to address the patients' critical needs. Due to the lack of clinical experience, understanding of care team dynamics and resource availability of different environments, depth of knowledge, the subinternship can be overwhelming and stressful. That in turn can make the experience sub-par, leading to low confidence levels and loss of self-belief. Sometimes, despite the patient's delivery of care with the right intention, an unforeseen complication leading to a near miss can cause a loss of mutual trust and respect from patients, peers, and supervising physicians. Young doctors should understand early in their career that patient care needs to apply acquired medical knowledge during initial medical training as a part of a collaborative team effort with appropriate navigation of time and resources while minimizing adverse events. To provide them with the window of opportunity to simulate the real clinical situations to improve self-confidence, team building, time management, and situational awareness with a risk-free and psychologically safe environment, we created a curriculum to orient subinterns before starting the advanced medicine rotation. This curriculum involves the simulation of cases using a high fidelity simulator, an innovative medical themed escape room, point of care ultrasound training on standardized patients, and a session of nuts and bolts of advanced medicine by faculty and/or chief residents. We received overwhelmingly positive feedback on a survey that was conducted following the orientation. Among 111 students who have participated thus far, 100% found these sessions helpful. In the written feedback, sessions were reported to be very interactive, entertaining, hands-on, serving as a medical knowledge refresher. Participants were happy about learning teamwork, communication, and reported the session helped in alleviating anxiety around patient management in an emergency setting. One student mentioned, "This was a low-stress introduction to advanced medicine that outlined expectations." The other student quotes, "It was a good balance of necessary information for success in the internship, with engaging, interactive educational sessions mixed in"

2.1 Simscape – Incorporating Gamification into medical learning:

Gamification is the application of typical elements of game playing in a non-game context [7]. The concept serves medical education as it promises to make stressful learning processes fun and enjoyable. It helps to motivate learners, increases engagement and encourages social interaction in a learning environment [8]. Escape Rooms are a team-based activity where a group completes a series of puzzles to achieve the goal of escaping [3]. To introduce gamification into our orientation curriculum, we added a medical themed escape room to our pilot project, SimScape. The objective of Simscape is to facilitate autonomy, effective teamwork, with sets of achievable goals for participants. The participant is expected to generate an idea with available clues, appropriately communicate with other team members to solve a complex medical puzzle within a given time constraint. With this activity, we aim to improve effective communication, team building, situational awareness, proper use of resources, and boost self-confidence.The three factors that attribute to the popularity of escape rooms in medical education are the new generation population, gamification's societal impact, and its delivery convenience[3].

When asked about the escape room experience, out of the 111 students that were surveyed, 66.7% found it to be very useful, 21.6% found it moderately useful, 9.9% found it slightly useful, and only 1.8% did not find it useful. One student found this exercise helpful, quoting, "Learning to work as a team and understanding the importance of individual roles that enhance teamwork." Based on encouraging positive responses to our Simscape project, we plan to continue this orientation curriculum as a long-term project, and hope to make a positive difference in the students' education. We believe that despite appearing to be a superficial form of entertainment, Simscape when used effectively, will act as a low-cost, high-impact resource for a variety of learners. However, due to the pandemic, changes will need to be made to the structure of Simscape (such as masks, hand hygiene, reducing the number of students in each session, etc.) to ensure continued safe implementation until all the students are vaccinated. The limitations of an escape room session is lack of human factor, malfunctioning games/puzzles, initial moderately high costs to create and conduct a life size

environment however once created, the games can be changed very easily based on learner objectives and learner levels.

2.2 Simulation - Risk-free environment for managing complex medical cases

Simulation is helpful to supplement training in real clinical situations. In the traditional medical learning apprenticeship model, the expectation is the learners should start with more manageable tasks and then proceed to more challenging ones. However, it is not always the case to have a graded exposure to challenges in the real world. The simulation creates an experience of undergoing a clinical scenario with graded levels without involving human patients to overcome these constraints [5]. In a psychologically safe environment, simulation allows learners to experience failure and recognize when they are approaching or crossing their competence limits. The ability to pause, restart and replay a clinical encounter during simulation provides invaluable opportunities to apply educational principles to the clinical setting. It is also possible to give the learners the tasks of a suitable level of challenge to provide feedback with the room to improve. It also offers an opportunity to create tasks that would otherwise be impossible owing to limited materials or resources. We use high fidelity simulators to simulate various case scenarios replicating rapid response calls addressing critically ill patients and mock codes. We aim to educate medical students on the various aspects of medical care delivery to navigate patient evaluation, interact and effectively communicate with the multidisciplinary team in high adrenaline situations, situational awareness, timely decisions, and their impact on patient care. Regarding the high-fidelity simulation, among the 111 students who participated in the exercise**,** 77.4% found it very useful, 16.2% found it moderately useful, 6.3% found it slightly useful, and 0% found it not useful. When asked to describe the experience, a student stated, “Simulation helps not only how to work in teams but the medical management of acutely ill/crashing patient.” The strength of the simulation module is to have educators at various levels of training to understand the gaps and needs of the trainee and work towards the common goal of the improved educational experience. The limitations of the simulation are lack of human factor, malfunctioning mannequins, and high costs to purchasing and managing the simulation setting.

2.3 Other learning opportunities

Our orientation curriculum also incorporates learning the basics of point-of-care ultrasound (POCUS) for patient evaluation. The students well received the session and reported that this motivated them to learn more about using bedside ultrasound in clinical evaluation. When asked about POCUS, out of the 111 students who participated in the exercise**,** 75.6% found it very useful, 18 % found it moderately useful, 6.3% found it slightly useful, and 0% found it not useful. Based on this feedback, the interest in POCUS in our new generation of students shows the willingness to incorporate new technology into medical training and the eagerness to learn and adapt with time.

The other aspects of our curriculum focused on nuts and bolts of advanced medicine, educating expectations from sub interns, educating polypharmacy, choosing wisely, pager education, sign-out process using I-PASS.

3. Conclusion

With the changing scope of medical education, the incorporation of learned-based education techniques like high fidelity-based simulations, escape rooms, and POCUS is well received by the current generation of young doctors in training. As an educator, we should continuously lookout for innovative ways for providing education to fulfill the aspiration of young budding doctors.

4. References

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