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Getting Hands On:

A reflection of the value of immersive simulation with 360-degree projection for Paramedicine students

By Abbie Little, Peter Zeniou, Amelia Maxwell, Steve Whitfield, and Alex MacQuarrie

Abstract

BACKGROUND

There is considerable debate surrounding simulative education. Within paramedic training, high fidelity simulation can be extremely helpful, however costly and high stress. As students, we evaluate our personal experience at Emergency Australia's high fidelity simulation facilities.

CONTEXT

We are three bachelor of paramedicine students from first and second years at Griffith University. We were selected at random to participate for the first time in high fidelity scenarios, while our physiological responses were measured by Hexoskin and Astroskin biometric shirts.

SUMMARY

In general, students found the immersive simulation to be

a positive experience and reported that the high-fidelity scenarios created a safe learning environment in which they could apply and enhance their clinical skills. Negatives of the immersive simulation included cost, accessibility, over-confidence and potential detriments to student's physical and mental health.

CONCLUSION

While overall students found the immersive simulation to be beneficial, more research is necessary to determine the effectiveness of high-fidelity simulations in comparison to low/medium-fidelity simulation, with specific consideration of factors such as cost and long-term psychological effects on students.

INTRODUCTION

Simulative educational experiences have become a valuable tool in the training of upcoming health professionals throughout the entire health sector. Consequently,

educational facilities have seen a growth in the use of clinical simulation, with the benefits being vast if utilised correctly (1). Simulation can enhance the learning experience of healthcare students by reducing medication errors, promoting effective communication and developing critical thinking skills (2). This is particularly important for paramedics who graduate from their degree and are expected to uphold service values whilst performing under new organisational, environmental and personal stressors.

This article will reflect on student's personal experiences from the immersive simulation at Emergency Australia, Brisbane, Queensland. It will provide an overview of the high-quality scenarios encountered whilst students were biometrically analysed. This discussion also incorporates a recount of both positive and negative points of the simulation, considering various aspects from cost effectiveness to personal advancement. Additionally, students conducted an in-depth evaluation of the event as a whole as well as analysing the literature surrounding student simulation.

THE SIMULATION

On December 14th, 2020, three first year and three second year paramedic students from Griffith University Paramedicine program, were selected to participate in Emergency Australia's 360-degree, high fidelity, and immersive simulation facility. The objectives were to experience immersive simulation while getting feedback on student physiological response to that experience. On arrival, the second-year students donned Hexoskin and Astroskin biometric shirts, underwent biometric body analysis, and had their basic vitals recorded. They were then called out Code 1 to a male patient with chest pain in a jazz bar. The students entered the projected jazz room to find what felt like blazing heat, broken bottles, loud music, and a middle-aged man experiencing an Inferior STEMI.

They followed their guidelines. The patient went into cardiac arrest where twelve minutes of high-quality resuscitation ensued before the return of spontaneous circulation (ROSC) was achieved and the scenario ended. The students' vitals were quickly measured again, with analysis of heart rate, blood pressure, respiratory rate, temperature, and g-force that the biometric shirts provided throughout the scenario.

In a similar process, the first-year students followed the same biometric analysis protocols, however entered a scenario where a patient sustained traumatic injuries at a mining sight. They provided basic care and had to evacuate the patient before simulated explosions took place. As first

year students who had not yet attended placement, they found the immersive simulation to be both exciting and challenging. It was their first experience of applying our clinical knowledge to dynamic, high pressure environments that extended beyond the scenarios run at university and allowed a deeper understanding of the challenge's paramedics face on road.

The last scenario involved two teams of three students entering a "war" zone, with the task of treating patients and evacuating them. They entered a room full of smoke, low visibility, and simulated gunfire. There were special forces dressed in full combat gear, with guns, yelling while students providing tourniquets to amputated arms. This simulation was the most intense of that day.

Overall, students expressed feelings of gratitude for the high-fidelity experience that allowed them to feel and act like graduate paramedics. They were able to use their skills under realistic and pressurised circumstances which was both refreshing and fulfilling. The scenarios were designed to place the students under immense pressure, and all paramedic students thrived, however not without positive and negative revelations of the experience.

POSITIVES AND NEGATIVES

The immersive simulation was overall a positive experience that facilitated clinical decision-making and challenged students to apply their clinical knowledge to realistic, high fidelity scenarios without posing risk to a patient (4). Research on simulation as an educational tool for healthcare professionals indicates that simulation fosters effective communication both with patients and with peers, as well as promoting patient safety by preventing medication errors. It also encourages teamwork by allowing students to work together to understand their roles in specific patient care scenarios and allows students to practice delegating appropriately.

Finally, simulation enhances critical thinking and clinical decision-making by creating a student-centred approach to learning where students are able to apply their clinical knowledge (2). Immersive simulation further encourages these positive outcomes by creating a sense of realism within scenarios. The layout and features of the room resulted in lifelike scenarios that incorporated most factors of real-life cases. 360-degree projection allowed the room to be transformed into any environment, supported by temperature, sound effects and lighting.

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The external viewing room for facilitators and peers was another prominent feature as it decreased distraction and reliance on others for questions and confirmation. With this enhanced realism, the effectiveness of simulation as a learning tool is increased, as students are able to experience first-hand how external factors can cause distraction and disruption in real cases (2).

Negatives of the immersive simulation include cost, time, accessibility, potential effects to student wellbeing and overconfidence. Immersive simulation is very expensive, as high-fidelity simulation mannequins alone can cost between \$30 000 - \$200 000 (2). Travel to external areas for training takes time and can also create additional expenses in terms of loss of employment hours and travel costs. Additionally, with the current situation with Coronavirus, simulations facilities without COVID-19 safe plans in place could result in poor social distancing and prove inappropriate.

The benefits of high fidelity, immersive simulation versus low fidelity simulation is also still under question, as high-fidelity simulation can create an environment less suitable for students to make mistakes, receive advice and make adaptations to treatment pathways concurrently. Furthermore, the high stress and realism of immersive simulation can be mentally, physically and emotionally draining and thus be detrimental to paramedic students' well-being if not managed correctly. Staff at Emergency Australia conducted post simulation debriefing that positively contributed to addressing the issue of stress in all our simulations. There is also potential for overconfidence in students following high fidelity simulation training, and some research indicates that this type of training does not always foster improved knowledge and skill compared to low fidelity simulation (3). More research is necessary to determine if the additional resources and time needed for high fidelity training is justifiable and actually leads to improved performance.

ANALYSIS

Through analysing the positives and negatives of the experience which the students undertook, it is generally agreed that high-fidelity simulation has the potential to better prepare paramedic students for their careers. This conclusion is also reported throughout various trials conducted on nursing, physiotherapy, and medical science students (5). Based on these reports, it can be suggested high fidelity simulation should be applied in any educational facility teaching paramedic students. However,

further long-term research is required to understand the mental and physical effects of high-fidelity simulation. In addition, other complications may impede the practicality of applying high fidelity simulation in educational facilities.

Assuming preparedness for future career in student paramedics is the primary consideration, it is holistically agreed that if high fidelity simulation can be utilised, then it should. This observation has been recorded in articles dating back to 2003, representing the timeframe in which the benefits of high-fidelity simulation has been understood (10). In addition, recent advancements in the availability of advanced training equipment (2), and the prominence of evidence supporting high fidelity simulation, raises the question: Why haven't educational facilities provided high fidelity simulation to student Paramedics? Currently, very little evidence surrounding the disadvantages of high-fidelity simulation can be sourced, especially regarding the emotional and physical implications.

Therefore, remaining practical factors such as cost may present as the primary barrier preventing higher fidelity simulation from being implemented. In addition, educational facilities may already be providing simulation at a level as high as possible within their institution. This conclusion can be made on the basis that educational facilities should be aware of the benefits of high-fidelity simulation, and in addition should have access to advanced training equipment. In result, the answer to the previously stated question may be that they already are to the best of their abilities.

Regardless of the universities' current ability to provide high fidelity simulation, simulation at a higher fidelity than what is currently provided yields the potential to encourage further growth as future clinicians (6). In order to encourage this growth, further attention should be directed towards the financial aspect of educational institutions. This is because optimal high-fidelity simulation usually requires static, dedicated, and sophisticated equipment supported by expert faculty (7).

In addition, providing high fidelity human patient simulation is five times more expensive than medium fidelity simulation. Medium fidelity simulation is also considered to be of better value than high fidelity simulation (8). Although these resources are readily available, they require generous funding which many institutions do not yet provide. For this reason, cost may present as the primary reason why true high-fidelity simulation has not yet been deployed.

In relation to the long-term implications of high-fidelity simulation, there is little to no evidence exploring the development of adverse psychological effects later on in a student's career. It is known that paramedic students experience greater anxiety and salivary cortisol levels in direct response to the high-stress scenario (9). However, evidence also suggests with effective implementation of systems and interventions aimed to support student Paramedics with acute stressors can assist (9). Current reports primarily apply to students within a short-term basis, therefore further research should also be conducted surrounding the long-term implications of high-fidelity simulation specifically.

CONCLUSION

The world class simulative facilities at Emergency Australia provide an exciting way forward in terms of paramedic student education. Whilst there are many positives of immersive simulation such as enhanced skills and preparedness for field work, simulation doesn't come without some negative considerations. Overall, our collective perspectives of the immersive experience was one of gratitude, excitement and positivity. The capacity to enhance our skills seemed limitless in such an environment. However, it is necessary to consider how consistent exposure might increase the already extensive stress levels paramedic students endure. Moreover,

how it might decrease the ability for assessor feedback simultaneously throughout a scenario.

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