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Using Design Thinking to Improve Student Feedback in Healthcare Simulation

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ABSTRACT

Patient safety remains a critical global challenge, with medical errors contributing to an estimated 400,000 deaths annually worldwide. Simulation-based training, particularly using Standardized Patients (SPs), has emerged as a promising approach to reducing such errors by providing medical students with realistic, hands-on learning experiences in a safe environment. SPs play a multifaceted role in simulation training, including designing case scenarios, delivering feedback, and ensuring the consistency of simulation outcomes. However, despite their importance, SPs face significant challenges in providing effective feedback, often due to limited resources, support, and the complexity of balancing multiple responsibilities. This paper explores the challenges SPs encounter in the feedback process and investigates strategies to better support them in their roles. It also examines the potential of design thinking—a user-centered, innovative problem-solving approach—to enhance SP training and improve the quality of feedback delivery. By engaging stakeholders such as medical educators, SP trainers, and students, this study aims to contribute to the development of more effective and supportive simulation training practices, ultimately enhancing patient safety and the quality of healthcare education.

Keywords: Design thinking, Healthcare simulation training, Feedback, Human centric design, Interdisciplinary design, Simulated patient, Standardised patients (SPs), Healthcare design, Patient safety, Medical errors, Simulation-based training, Medical education, Experiential learning, Healthcare training, Communication skills

INTRODUCTION

Patient safety is an ongoing challenge in healthcare, and with an estimated 400,000 deaths worldwide each year due to medical errors (Kaneko and De Moraes Lopes, 2019; Jones, Passos-Neto and Braghiroli, 2015) it is of major concern. At the close of the 20th century, the continuous gaps in healthcare quality and safety worldwide were reported from the World Health Organization, the Organization for Economic Cooperation, which included the high rates of medical errors (So et al., 2019). This makes the issue of medical errors a significant concern for healthcare systems across the globe. One way to address this problem is using simulation-based training (Jones, Passos-Neto and Braghiroli, 2015), which allows medical students to practice and refine their skills in a controlled environment before engaging

with real patients. Among the many methodologies used in simulation training, Standardized Patients (SPs) can be used in order to provide a more realistic and humanized learning experiences for students (Nestel, Sanko and McNaughton, 2017).

As mentioned earlier, SP simulation offers a unique methodology where students and professionals participate in hands-on learning by interacting with trained actors who role-play patients in various clinical scenarios. This type of experiential learning not only helps students build technical skills but also develop their communication and decision-making skills in a safe, non-threatening environment. SPs take on a variety of critical roles in this process: they design case scenarios, provide feedback to students, and even train other SPs to ensure the consistency and effectiveness of the simulation outcomes (Lewis et al., 2017; George, Wells and Cushing, 2022; Brem et al., 2023).

Despite the importance of SPs in medical education, their role in delivering feedback to students is challenging. They are expected to juggle multiple responsibilities—often with limited support or resources—and may struggle to find the right balance in their feedback, which is crucial for student development. Given these challenges, it becomes important to have SPs better prepared to fulfill their roles more effectively in order to give useful feedback to students and help them train and gain the right knowledge to provide better patient care in future. Thus, we can see there are many complexities within the feedback process during the SP-based simulation, and thereby, it is important to explore the obstacles SPs face and in addition, understand how they can be better supported.

One way to address this issue is using human centric design approach to improve training for SPs, ensuring that they are prepared to give constructive and positive feedback. Human centric design, with its user-centered approach, can provide innovative solutions to challenges SPs face while providing feedback and help create a more supportive environment. By involving multiple stakeholders—such as medical instructors, SPs, and the students—we can collectively work towards improving the entire simulation training process.

METHODOLOGY

Study Questions

Through a narrative literature review, this paper addresses the following research questions:

1. What challenges do SPs face when providing feedback to medical students?
2. What support and resources do SPs require to facilitate appropriate feedback to students?
3. How can design thinking interventions in training design help prepare SPs to provide feedback to students?

Search Strategy

The study is multidisciplinary in nature, encompassing healthcare, design, and human behavior. To ensure a comprehensive search, key terms were broken down and searched across databases such as Scopus, Google Scholar, and PubMed. The search process was iterative, refining terms to achieve the most relevant results. Initially, adding certain terms yielded no results, so two distinct search strategies were employed as follows:

(simulation training OR simulation education OR simulation learning OR simulation) AND (simulated patient OR standardized patient) AND (simulation feedback OR simulation debriefing)

(simulation training OR simulation education OR simulation learning OR simulation) OR (healthcare education OR medical education) AND (design thinking OR human-centered design OR user-centered design OR design process OR design-based innovation OR design-oriented innovation).

The first search focused on understand the gaps and current practices in feedback during the simulation training within healthcare. The second search explored how human-centric design or design thinking is applied in healthcare education. A total of 20,844 articles were identified based on the search criteria.

Criteria for Inclusion, Exclusion and Data Analysis

The initial screening was done by reviewing the abstracts to identify articles relevant to feedback implementation in healthcare simulation. Articles that did not involve simulation patients or standardized patients were excluded, as were review articles and those focusing on high-fidelity simulation. Only papers written in English and primarily from the United States were included. After removing duplicates and the literature review articles, a total of 15 articles were selected: 13 focused on simulation training feedback, and 2 explored the application of human-centric design in healthcare. As mentioned above, no articles were found that specifically applied human-centric design to feedback implementation in healthcare simulation training using SPs.

RESULT

Simulation in Healthcare

To address the challenges of medical errors, simulation-based training has been widely incorporated into medical education. Simulation is a technique that creates experiential learning opportunities for medical students and professionals without the need for real-world involvement (Jones, Passos-Neto and Braghiroli, 2015; So et al., 2019; Okuda et al., 2009). It provides a safe environment where individuals can reflect on and learn from their mistakes without jeopardizing their professional identity (So et al., 2019), thereby ensuring patient safety. Through simulation, students become aware of their competencies and limitations, learn when to take help, and develop strategies to prevent errors, all of which contribute to improved patient well-being (Ziv, Ben-David and Ziv, 2005).

Simulation in medical education is designed for teaching laboratories and centers to help students build both technical skills, such as specialized procedures, and non-technical skills, such as cognitive and social abilities (Kaneko and De Moraes Lopes, 2019). It is important to note that simulation training is not limited to students but also includes trainees, participants, examinees, or candidates, depending on the context (Lewis et al., 2017). For the purposes of this paper, the term *students* will be used to refer to all learners.

According to Gaba (2004), "Simulation is a technique—not a technology—to replace or amplify real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner." Simulation allows students to apply theoretical knowledge to practice, reflect on their skills, and build their knowledge base (So et al., 2019). It also enables students to repeatedly practice procedures, clinical skills, decision-making, patient management, and teamwork in a controlled environment (Ziv, Ben-David and Ziv, 2005). By receiving constructive feedback, students can identify and correct mistakes, reducing errors in real-world patient care (Kim, Kim and Kim, 2020; Ziv, Ben-David and Ziv, 2005). In other words, simulation prepares students with the knowledge, skills, and attitudes necessary to adapt to various clinical scenarios and novel encounters (So et al., 2019; Kaneko and De Moraes Lopes, 2019).

The fundamental part of simulation training is designing the case scenarios, which help organize courses, competencies, and training for healthcare professionals and students. To maximize the effectiveness of simulation and immerse students in the scenarios, the right environment must be established (Molloy et al., 2021). This includes both physical and human setups, as well as the medical tasks students are expected to perform.

The physical setup replicates real-world clinical settings, such as an ICU during an emergency scenario, complete with appropriate lighting, visual elements, odors, and equipment. The human setup involves SPs and other medical team members, who help create an immersive experience that evokes emotional responses from students. This setup ensures that students and SPs experience realistic situations that replicate the complexities of real patient care.

Lastly, the medical tasks are the objectives or goals students must achieve during the simulation. These tasks are structured to demonstrate the application of theory to practice, helping students build technical and clinical skills (Sittner et al., 2015; Penni et al., 2021; Ziv, Ben-David and Ziv, 2005). Institutions typically provide a guide for designing scenarios, involving a team of instructors, SPs, actors, administrators, and other simulation center staff to create realistic and effective training experiences (Kaneko and De Moraes Lopes, 2019).

It is important to note that the running cost of SPs is significantly lower compared to other simulation methodologies (So et al., 2019). This makes SP-based simulation an affordable option for medical education centers, enabling them to provide high-quality training at a lower cost while helping students practice in a safe and controlled environment.

SPs in Simulation Training

SPs have been a part of healthcare simulation since the late 1960s (Jones, Passos-Neto and Braghiroli, 2015). In recent years, there has been increased recognition of SPs, and they enacted by wide range of people, including clients (actors), family members, and healthcare professionals. Standardized Patients (SPs), also referred to as simulated patients or human simulation, involve trained human role-players who interact with learners during experiential simulation training (Lewis et al., 2017). SP simulation is a methodology in which students and professionals engage in experiential learning by interacting with human role-players in various case scenarios and assessments. SPs take on numerous tasks, such as designing case scenarios, providing feedback to students, and training other SPs to ensure effective simulation outcomes for learners (Lewis et al., 2017; George, Wells and Cushing, 2022; Brem et al., 2023).

As SPs immerse themselves in their roles, they often become physically and emotionally vulnerable (Bagacean et al., 2020). Therefore, creating a safe space is crucial to ensure that SPs feel secure and comfortable providing feedback. In other words, SPs are actors who portray patients based on a script in a consistent and standardized manner. Some simulation labs and institutions employ SP educators who train SPs to develop the necessary skills and familiarize them with the methodologies used in the facility. In certain institutions, SPs not only act as patients but also collaborate with the simulation team to plan and develop case scenarios, including feedback methodologies (Lewis et al., 2017). To achieve this, training is essential for non-medical SPs to bridge the knowledge gap and ensure they are well-prepared for their roles.

SPs provide feedback on student performance based on the perspective of the role they are portraying, which includes evaluating both technical or clinical skills and communication or soft skills (Lewis et al., 2017). In other words, SPs offer unique and valuable feedback based on their emotional experiences, the trust established during the interaction, and their understanding of the information provided by the student, as well as the student's behavior and actions during the simulation session (Kim, Kim and Kim, 2020). Thus, SPs play a critical educational role in providing feedback (Berenson, Goodill and Wenger, 2012), and it is essential for institutions or simulation centers to provide them with a safe and controlled environment to deliver effective feedback (Jones, Passos-Neto and Braghiroli, 2015).

Studies shows that feedback is one of the crucial elements for successful simulation learning environments (Kaneko and De Moraes Lopes, 2019). Feedback enables students to reflect on their performance, identify areas for improvement, and develop the skills necessary for effective patient care.

SPs Providing Feedback and Challenges

It is important to understand why feedback is useful in simulation training and how it benefits students (Jones, Passos-Neto and Braghiroli, 2015). According to Lederman (1992), the debriefing process consists of seven elements:

1. The person who debriefs (in this case, the SPs), who experiences, observes, and interprets the simulation.
2. The participant (the student), who receives the debriefing.
3. The experience, which refers to the simulation scenario.
4. The impact of the experience, which is generated during the simulation.
5. The recollection of the experience, where the student reflects on what occurred.
6. The reporting on the experience, where the student shares their reflections.
7. The time to process the experience, allowing the student to internalize the lessons learned.

The primary purpose of debriefing or feedback is to create a safe and comfortable environment where learners can reflect on, analyze, and discuss their experiences. This process helps students identify performance gaps, improve areas of weakness, and maintain strengths, ultimately enhancing their overall performance in simulation training (Sawyer, Fleegler and Eppich, 2016).

It is also essential to distinguish between feedback and debriefing, as both play vital but distinct roles in simulation training. Feedback is typically unidirectional, providing students with input on their behavior and performance, along with suggestions for improvement. In contrast, debriefing is a reflective, bidirectional discussion that helps learners integrate insights from the simulation into future actions (Sawyer, Fleegler and Eppich, 2016). During simulation, students not only need guidance to correct errors but also opportunities to reflect on and analyze their mistakes (Ziv, Ben-David and Ziv, 2005).

SPs must be mindful of how they provide feedback or debriefing, tailoring their approach to the specific needs of the simulation and their own experience. This requires an understanding of what and how to deliver feedback in a way that encourages student reflection and creates an emotionally balanced and safe learning environment. As students receive feedback, they must critically evaluate their own learning and practices (Miettinen, 2000). This process involves transferring knowledge to the student while balancing the emotional load they can handle during the simulation experience.

Additionally, SPs should also learn to frame non-judgmental questions to foster constructive discussions. During feedback sessions, students should be encouraged to speak more than the SPs, following the 80/20 rule. In this model, students speak for 80% of the time, sharing their reflections and actions, while SPs speak for 20%, providing specific feedback on what felt comfortable or uncomfortable and asking how the student's thinking process could be improved.

To achieve this, SPs must continually reflect on and improve their ability to provide effective feedback or debriefing. This requires sound judgment and ongoing training, often facilitated by SP educators. Training is essential to ensure that SPs maintain consistency and accuracy in their feedback, enabling effective knowledge transfer (So et al., 2019). Timely feedback is a critical

factor in effective learning, as it allows students to immediately connect their actions with the outcomes (So et al., 2019).

Feedback in simulation training typically involves three key components: planning, prebriefing, and debriefing (Sittner et al., 2015; Sawyer, Fleegler and Eppich, 2016; Molloy et al., 2021). During the planning phase, instructors determine when and how feedback will be provided. In the prebriefing phase, learners and SPs are informed about the expectations, case scenarios, and learning objectives. Debriefing can occur at different times, depending on the simulation design. In some cases, debriefing occurs during the simulation (intra-simulation debriefing), where feedback may be non-verbal (e.g., through body language) or verbal, with the scenario paused to provide input before continuing. This approach has been shown to improve performance (Sawyer, Fleegler and Eppich, 2016). Post-simulation feedback is more detailed and can take the form of group discussions, one-on-one sessions, or personal reflection.

In group discussions, instructors, SPs, and other team members (referred to as confederates) analyze video recordings of the simulation to provide feedback (Nestel et al., 2014). One-on-one sessions are more intimate, offering personalized insights and feedback based on the student's performance. In some cases, audiovisual documentation is used to highlight positive instances and errors during the session. Personal reflection involves students analyzing the causes of errors and developing strategies to address them (Ziv, Ben-David and Ziv, 2005). In all feedback or debriefing sessions, students are encouraged to share their emotions, reflections, and analyses, with guidance from instructors (Ziv, Ben-David and Ziv, 2005; So et al., 2019). This creates a safe and honest learning environment that fosters reflection and growth.

In some scenarios, feedback frameworks are incorporated, requiring SPs to follow a structured approach. This necessitates that SPs not only understand the framework but also receive adequate training to deliver feedback effectively. The interplay of knowledge and experience enables SPs to apply the right debriefing strategies during simulation sessions (Sawyer, Fleegler and Eppich, 2016). Interestingly, feedback not only helps students improve their skills but also fosters humanistic values such as honesty, humanity, transparency, and trust (Ziv, Ben-David and Ziv, 2005).

To achieve these outcomes, well-trained facilitators and instructors are crucial. Without dedicated time and effort from trainers, the standards of debriefing and simulation sessions may decline, impacting the quality of feedback and skill development (So et al., 2019).

Simulation training design is often based on existing frameworks. In recent years, associations such as the HealthySimulation (Baily, 2025), Association of Standardized Patient Educators (ASPE), and the International Nursing Association for Clinical Simulation and Learning (INACSL) have been established to promote standardization in human simulation, both within and outside the United States (Lewis et al., 2017; Sittner et al., 2015). These frameworks can serve as a foundation for institutions to personalize their simulation processes based on specific needs and objectives. For example, ASPE focuses on building standardization, enabling SPs to perform their roles

consistently and provide relevant feedback to students. ASPE also advocates for the needs of SPs, offering resources and platforms for SPs to connect and learn (Lewis et al., 2017).

Training requirements for feedback include reviewing the fundamentals of feedback principles, informing SPs of the feedback objectives, and clarifying the level of students they will be working with. SPs must also be trained on feedback logistics, such as whether sessions will be one-on-one, in small groups, or as part of a simulation debriefing. Importantly, SPs should learn how to use their knowledge, observations, and experiences during simulations to provide feedback based on student behavior and actions (Lewis et al., 2017).

DESIGN THINKING IN SP TRAINING

As mentioned earlier, no existing research on the use of human-centric design in simulation training was found during the literature search. However, human-centered design has been incorporated into the medical field for some time. In the context of simulation training, design thinking can help clearly identify problems and address the needs of both trainees and students (Gottlieb et al., 2016). In this case, the challenges faced by SPs can be identified through insights gathered from instructors, students, and SPs themselves.

The benefits of incorporating a design-driven approach include fostering empathy, collaboration, and innovation, all of which are valuable for medical education. Additionally, the qualitative and divergent thinking aspects of design thinking enable educators to adapt to the evolving medical field (Gottlieb et al., 2016). Moreover, a human-centric design approach balances the needs of learners with performance objectives, ensuring that essential knowledge and skills are effectively conveyed (Schoenherr and McConnell, 2024). This approach can help develop training programs that are both suitable and effective for SPs. By considering the emotional, cognitive, and social responses of SPs, instructors, and students, educators can gain a deeper understanding of the factors that facilitate or hinder the acquisition of knowledge and skills (Schoenherr and McConnell, 2024). In this context, identifying the challenges SPs face during feedback sessions can help address gaps and enhance SP training to meet healthcare standards.

The involvement of different stakeholders within the simulation team, each bringing unique knowledge and perspectives (Schoenherr and McConnell, 2024), can significantly improve SP training. This collaborative approach enhances both the training materials and the overall process, helping to standardize the acquisition of knowledge and the continuous development and implementation of SP training resources.

CONCLUSION

It is evident that SPs play a crucial role in simulation training and bring in the human element to the learning experience, providing realistic patient interactions and delivering insightful feedback to students. Given their importance, the need for adequate training and resources for SPs is critical.

Training enables SPs to reflect on how best to provide feedback, develop decision-making skills, and gauge students' skills and emotions throughout the simulation session. By incorporating input from professionals and experts, SPs can build the knowledge necessary to fulfill their roles effectively.

In addition to providing SP training, simulation labs and institutions should offer opportunities for SPs to attend workshops and engage with professional associations. This is particularly important for SPs from non-medical backgrounds, as it helps bridge knowledge gaps and enhances their skills. Such initiatives allow institutions to create a safe and supportive environment for SPs, improving the feedback and debriefing processes. This ongoing development ensures that SPs remain effective in their roles and contribute meaningfully to student learning.

Human-centric design can serve as a valuable tool to foster collaboration among stakeholders, including instructors, SPs, and students. By gathering input from these groups, institutions can enhance the feedback training process for SPs.

Design thinking encourages empathy, collaboration, and innovation, which are essential for addressing the challenges SPs face in delivering feedback. This approach helps SPs bridge gaps in their knowledge and skills, leading to higher-quality feedback that benefits students.

Moreover, human-centric design supports the continuous improvement of SP training programs. As medical education evolves with advancements in technology and methodologies, this approach ensures that SP training remains relevant and effective. By maintaining high standards, institutions can provide students with the skills and knowledge needed to deliver high-quality patient care, both now and in the future.

In summary, the integration of human-centric design into SP training offers a structured and collaborative way to address challenges, improve feedback quality, and ensure that SPs are well-equipped to support student learning. This approach not only enhances the current training process but also prepares SPs and students for the future demands of healthcare education.

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