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Comparison of standardized patients with high-fidelity simulators for managing stress and improving performance in clinical deterioration: A mixed methods study☆,☆☆

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SUMMARY

Background: The use of standardized patients in deteriorating patient simulations adds realism that can be valuable for preparing nurse trainees for stress and enhancing their performance during actual patient deterioration. Emotional engagement resulting from increased fidelity can provide additional stress for student nurses with limited exposure to real patients. To determine the presence of increased stress with the standardized patient modality, this study compared the use of standardized patients (SP) with the use of high-fidelity simulators (HFS) during deteriorating patient simulations. Performance in managing deteriorating patients was also compared. It also explored student nurses' insights on the use of standardized patients and patient simulators in deteriorating patient simulations as preparation for clinical placement.
Methods: Fifty-seven student nurses participated in a randomized controlled design study with pre- and post-tests to evaluate stress and performance in deteriorating patient simulations. Performance was assessed using the Rescuing A Patient in Deteriorating Situations (RAPIDS) rating tool. Stress was measured using salivary alpha-amylase levels. Fourteen participants who joined the randomized controlled component then participated in focus group discussions that elicited their insights on SP use in patient deterioration simulations.
Results: Analysis of covariance (ANCOVA) results showed no significant difference ($p = 0.744$) between the performance scores of the SP and HFS groups in managing deteriorating patients. Amylase levels were also not significantly different ($p = 0.317$) between the two groups. Stress in simulation, awareness of patient interactions, and realism were the main themes that resulted from the thematic analysis.
Conclusions: Performance and stress in deteriorating patient simulations with standardized patients did not vary from similar simulations using high-fidelity patient simulators. Data from focus group interviews, however, suggested that the use of standardized patients was perceived to be valuable in preparing students for actual patient deterioration management.

Introduction

The delivery of safe patient care is essential to achieve optimum outcomes, particularly in the management of high-acuity clinical events such as patient deterioration. It has been suggested that emotional state is as vital as intellect when it comes to decision-making (Appelbaum, 1998). Stress, which is closely tied to emotions (Lazarus, 1999), involves both emotional and physiological responses to a stressor. In the classical theory of stress by Lazarus and Folkman (1984), it is defined as "a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p. 19). Stress is viewed as a connection between an individual and his environment, and physiological responses between individuals vary depending on the differences in cognitive appraisals of stressful events. Whether stress enhances or impairs performance depends on how a stressful stimulus is appraised (Lazarus and Folkman, 1984). Appropriate levels of stress, therefore, may have some value when stressors are appraised as challenges rather than threats.

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Stress, resulting in anxiety, can affect health-care professionals' clinical performance either positively or negatively in highly stressful clinical environments (LeBlanc et al., 2012; Müller et al., 2009; Melincavage, 2011; Wetzel et al., 2006). A recent study by Macdougall et al. (2013) supports the view that stressful clinical events may not necessarily impair clinical performance. In this study, additional stress in simulations did not decrease students' clinical confidence or knowledge (Macdougall et al., 2013), suggesting a lack of negative effects on performance. This is in agreement with another study that found an enhancement of advanced cardiac life support skills after addition of emotional stressors during simulation (DeMaria et al., 2010). It is vital to note, however, that these results were derived from studies conducted in simulated environments. Findings, therefore, may not be similar when investigation occurs in real clinical settings. Conversely, high cortisol levels indicative of stress has also been shown to impair performance (Arora et al., 2010; Harvey et al., 2010; LeBlanc et al., 2012). These studies involved fast-paced high-acuity simulations that caused sudden stress. Thus, cortisol increase was a response to this acute stress. Amylase, however, reacts more rapidly to a psychological stressor compared to cortisol with no carry-over effect (Takai et al., 2004). As a result of the acute nature of simulations and of patient deterioration in clinical settings, salivary amylase may be a better measure of acute stress. It is known to increase rapidly after introducing stressful stimuli as compared to cortisol (Takai et al., 2004).

Nurses play a vital role in the recognition and management of patient deterioration. As such, stressful incidents may affect their clinical performance notably when there is negative appraisal. It is therefore essential to prepare student nurses to manage emotions and stress better during training (LeBlanc, 2009; Liaw et al., 2012). The emotional content of learning experiences can be addressed during simulation as this is a safe modality through which the emotional climate of a stressful clinical event can be replicated (Kneebone, 2005). In high-fidelity simulations, a real-world environment is created such that learners are fully immersed in simulation. To make these simulations interactive, high-fidelity simulators (HFS) and/or standardized patients (SPs) are utilized. Because of the resultant learner emotional engagement during high-fidelity simulation training, authentic emotional responses similar to those in the actual setting are expected (Flanagan, Nestel and Joseph, 2004). It is thus postulated that by creating a simulation experience that provides not only physical fidelity, but also psychological fidelity, learners can be trained to manage stress better, resulting from the perception that stress is a challenge rather than a threat. In this case, resources are viewed as outweighing the demands, and thus can lead to enhanced performance (Lazarus and Folkman, 1984; LeBlanc et al., 2012).

According to Becker et al. (2006), "standardized patients are individuals who have been carefully trained to present an illness or scenario in a standardized, unvarying manner" (p. 103). It is also postulated that the use of SPs will accentuate the reality of simulations and create an approximation of the psychological responses toward a high-acuity clinical event. Studies, however, have demonstrated that SP encounters can cause anxiety, a response associated with stress, in students (Becker et al., 2006; Robinson-Smith, Bradley and Meakim, 2009). A study by Luctkar-Flude, Wison-Keates and Laroque (2012) demonstrated that perceived realism was higher when SPs were used; however, communication with 'real' patients was more stressful and produced higher anxiety in students. It is hence expected that SPs will increase students' stress levels during deteriorating patient simulations. Standardized patients become added emotional stressors that enhance clinical performance. This premise is supported by a study by DeMaria et al. (2010), which found that addition of emotional stressors in simulation increased anxiety and was correlated with enhanced performance. This is because during emotional learning experiences, such as during stressful events, the amygdala strengthens the memory for similar experiences, which brings about conscious recall (Cahill et al., 1996). The ability to recall and apply these learning experiences translates to better performance scores (DeMaria et al., 2010).

The aim of this study is twofold: to compare the effects of using SPs with using HFS on student nurses' stress levels and performance in managing patients in a simulated environment, and to explore their perspectives on these learning tools in deteriorating patient simulations as preparation for clinical placement. It was postulated that the student nurses in the SP group will experience greater stress as a result of using 'real' patients (SPs), but will have better clinical performance as compared with those in the HFS group at post-test, as evidenced by salivary alpha-amylase levels and performance tool scores, respectively.

Methods

Study Design and Participants

A mixed methods which included a randomized controlled trial (RCT) with a pre- and post-test design and qualitative focus groups was conducted. The mixed methods design was deemed appropriate as the qualitative data complemented the quantitative findings (Johnson and Onwuegbuzie, 2004). The RCT enabled the researchers to determine which group had higher stress levels and higher performance scores using objective measures. The focus groups, meanwhile, provided more subjective data by exploring students' insights on the two modalities and their perceived effects on stress and performance.

Participants were recruited from a nursing department in a university in Singapore. Ethics approval was given by the university's institutional review board. All Year Three student nurses ($N = 81$) enrolled in the Clinical Decision-Making module and who had had no previous experience in managing deteriorating patients in clinical settings were invited to participate. Fifty-nine students volunteered and gave written consent to participate. Participants were assured that they can withdraw from the study at any time if they feel that there is potential harm to their well-being or if they are uncomfortable with continuing in their involvement. Using a computer-based random number generator, the participants were randomly assigned to either the SP group ($n = 30$) or to the HFS group ($n = 29$). Two students withdrew after the pre-test. Only 57 students completed the post-test, with 29 participants in the SP group and 28 participants in the HFS group. In the qualitative study, the 57 students who completed the post-test were invited to participate in focus group discussions after a nine-week clinical placement. Fourteen students agreed to participate. The study's flow diagram is presented in Fig. 1.

Simulation Program

The study was implemented as part of the simulation program of the Clinical Decision-Making module. All Year Three student nurses were required to participate in multiple deteriorating patient simulations. After a pre-test simulation on performance, the participants went through a simulation intervention program that used either SP (SP group) or the SimMan® 3G HFS (HFS group). All the participants went through three deteriorating patient simulations using either of these modalities. As the three scenarios ran concurrently for both groups, the order of the scenarios was randomized for the participants. All scenarios, including patient parameters and SP or SimMan® 3G responses/scripts used for the two groups were identical, so that the degree of stress was the same for both groups. The only variable that could possibly affect stress was the modality used: SP or HFS. A post-test on student performance was then conducted a week later for all the participants. The deteriorating patient scenarios used in the simulations are presented in Table 1.