

## ESSAYS

# Spoonful of sugar: a case for stress-reduction interventions in medical simulation

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## ABSTRACT

In recent years simulation has gained popularity as an educational tool to shield learners from real-world consequence. However, the inherent risks levied upon those involved have largely remained unaddressed; psychological stress being one of the most potent. Research over the last two decades has shown us that an increase in simulation-related stress goes hand-in-hand with diminishing performance. It is, however, becoming more apparent that there is a solution to this problem, namely in the form of stress-reduction interventions. As educators the time has come to stop abandoning our learners at the edge of their limits, but instead support them in an environment free of the anxieties, stresses and worries that are all too *real* in the world around them.

### What this essay adds

- Discusses how the use of simulation in medical education can induce stress in participants.
- Highlights the inconsistency of current evidence surrounding the impact of stress on performance in simulation.
- Suggests future research is needed to explore stress-reduction measures in order to improve learning through simulation.
- Recommends approaches to develop stress-reduction techniques based on current evidence.

## Introduction

Simulation is a widely used training modality within the field of health profession education since errors do not carry the same weight of consequence as in the real world [1]. However, as in real-world scenarios, simulation has the distinct ability to evoke a multitude of biological, cognitive and emotional responses, all of which might influence learning and performance [2]. Research has shown that acute stress can either impair or improve learning and performance, depending on the individual, the stressor and the individual's conscious and subconscious evaluation of that stressor [3,4]. Therefore, opposing schools of thought argue as to what level of stress is most conducive to an optimized medical education experience [5]. In this essay we will explore the pitfalls of simulation-related stress whilst outlining

possible solutions, drawing attention to the necessity of an optimal simulation environment to maximize learner potential.

### Stress in simulation: a familiar foe

The human stress response is the product of eons of evolutionary biology and has developed with one primary goal: to allow us to evade danger [6]. Whilst most species concern themselves with actual or perceived danger in the here and now, humans suffer psychological stress – activation of the stress response via mere thought. This may offer a theoretical survival advantage, by permitting the avoidance of threatening situations, but in today's modern world, the detrimental effects of psychological stress seem to predominate. Many commentators talk about appraising one's situation and the ability to cope with said situation, stress being the end product of living through a situation expected to be too advanced for an individual's abilities; physically, psychologically or otherwise [7–10].

The stress landscape looks as such: a stressor (be that an object, an animal, a person, a place, a time or a mixture of any of the previous) is a factor that has the potential to evoke behaviours, emotions, memories and responses concerning an individual. That individual will appraise, or assess, these factors both consciously and subconsciously, mounting a response dependent on the behaviours, emotions and memories evoked. Stress may therefore be thought of as an umbrella term, aiming to portray the complex relationship between the environmental demands, resources, perceptions and responses of an individual or group [11,12].

It is precisely the cognitive domain in which simulation-related stress elicits some of its most sinister effects. Simulations inherently cause an increase in stress, as this platform is used to extend learners beyond their comfort zone and support them in a zone of learning that is often at the limit of their competency and responsibility. Such feelings are often amplified because of the nature of the scenario chosen, as they are often high-pressure life-or-death situations (e.g. cardiopulmonary resuscitation or managing a patient with massive haemorrhage). Bearing this in mind, one must consider the relationship between increasing stress and simulation performance.

Over the last two decades a range of studies have reported a decline in simulation performance as stress increases [3,13–16]. For example, LeBlanc et al. [3] report that high-stress simulation conditions are associated with lower accuracy drug dosing calculations, on comparison with low-stress conditions. Additionally, Fraser et al. [16] show that students in scenarios where a simulated patient dies unexpectedly report a higher cognitive load than those in scenarios where the patient survives; in an Objective Structured Clinical Examination 3 months later, it was found that students who witnessed the simulated patient death were less likely to have achieved the minimum pass score. Old adages such as 'baptism of fire' and 'in at the deep end' are still used to romanticize the high-stress approach to learning. Considering the aforementioned findings, it may be time to stop this approach, as plunging a learner into

an overwhelming environment may seriously harm their ability to master the necessary skills on which their given profession relies.

### Calm before the storm

Having shown that medical simulations can increase stress, which can, as a consequence, negatively affect performance, one may question the efficacy of simulation as an educational tool altogether. However, all is not lost. To counteract stress as a cause for impaired performance, a branch of educational research has focused on investigating the impact of interventions to reduce stress (e.g. repeated simulations, stop-and-go debriefing) and thus improve performance.

Again, over the last two decades a variety of studies have reported an increase in simulation performance after participating in an intervention to reduce stress [17–21]. Judd et al. [20] show that nurses involved in consecutive repetition of simulation scenarios (three times) report a decline in anxiety, whilst exhibiting a 19% increase in performance scores between pre- and post-simulation tests. Furthermore, Cheung et al. [21] show that medical residents who watch a brief mindfulness video prior to simulation exhibit a lower heart rate and make fewer procedural errors than those who do not. Taking this research into consideration, a theme is emerging: the educational benefits of simulation are optimized when paired with an appropriate intervention to reduce stress.

### Stressing the need for change: where to in the future?

Whilst some institutes and medical centres do employ stress-reduction interventions prior to simulation training, a vast number do not. This begs the question, 'Why is this happening?' As educators, we have a duty to our learners and the wider field of simulation, to ensure that educational techniques are used in a safe environment that is conducive to learning whilst protecting those involved from the anxieties, stresses and worries that a technique such as simulation inherently carries. Encouragingly, research into psychological safety is gathering interest, with Reece et al. [22] reporting that psychological safety can be established and maintained with both in-person and remotely facilitated simulation. In light of these findings, the integration of stress-reduction interventions may, therefore, offer an additional layer of protection against cognitive overload.

In a promising vein of research, Lilot et al. [19] show that simply introducing a 5-minute relaxation break, where a piece of text is read to participants in a soothing tone of voice prior to a simulation debriefing session, has marked benefits on information retention. Of course, as with all fields, more research is required. Although, it is unusual that such simple, cost-effective techniques can create such profound change, one might wonder, if stress-reduction interventions could be the spoonful of sugar that helps the simulation medicine go down?

We call upon the simulation community to consider a move in a new direction; one that loosens the shackles of

the educational status quo and truly places emphasis upon caring for the well-being of the learner; much the same as we have taught them to care for their patients.

## Declarations

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