


## ORIGINAL CONTRIBUTION

# Exploring participant experience to optimize the design and delivery of stress exposure simulations in emergency medicine

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## Abstract

**Objectives:** Emergency department (ED) teams frequently perform under conditions of high stress. Stress exposure simulation (SES) is specifically designed to train recognition and management of stress responses under these conditions. Current approaches to design and delivery of SES in emergency medicine are based on principles derived from other contexts and from anecdotal experience. However, the optimal design and delivery of SES in emergency medicine are not known. We aimed to explore participant experience to inform our approach.

**Methods:** We performed an exploratory study in our Australian ED with doctors and nurses participating in SES sessions. We used a three-part framework—sources of stress, the impacts of that stress, and the strategies to mitigate—to inform our SES design and delivery and to guide our exploration of participant experience. Data were collected through a narrative survey and participant interviews and analyzed thematically.

**Results:** There were 23 total participants (doctors  $n = 12$ , nurses  $n = 11$ ) across the three sessions. Sixteen survey responses and eight interview transcripts were analyzed, each with equal numbers of doctors and nurses. Five themes were identified in data analysis: (1) experience of stress, (2) managing stress, (3) design and delivery of SES, (4) learning conversations, and (5) transfer to practice.

**Conclusions:** We suggest that design and delivery of SES should follow health care simulation best practice, with stress adequately induced by authentic clinical scenarios and to avoid trickery or adding extraneous cognitive load. Facilitators leading learning conversations in SES sessions should develop a deep understanding of stress and emotional activation and focus on team-based strategies to mitigate harmful impacts of stress on performance.

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## INTRODUCTION

Simulation-based education can help individuals and teams improve performance under stressful conditions, but is usually focused on clinical knowledge and skills. Clinical skills are necessary, but not sufficient, when caring for patients with time-critical and life-threatening emergencies. Clinicians also need to recognize and regulate their personal stress responses and those of their team. Simulation training specifically designed to train recognition and management of stress responses might be the next frontier. However, there is limited understanding of the optimal simulation design, delivery, and debriefing to achieve these objectives. Without this understanding, we risk wasted effort in simulation design and delivery, and even psychological harms, in the pursuit of training clinicians to perform in the maelstrom of emergency care.

Emergency department (ED) teams frequently perform under conditions of high stress in the resuscitation room, and designing training interventions relies on an understanding of team performance under these conditions. Stress and emotional activation are complex constructs.<sup>1,2</sup> An individual's stress response is a result of the interaction of the demands placed by their environment and that person's resources to meet those demands. In the context of this paper, we adopt LeBlanc's definition; the terms "stress" and "stress response" will be used when referring to the "distress response that ensues once a situation is assessed as a threat to maintaining or achieving a primary goal."<sup>1</sup> Sources of stress for emergency clinicians include high patient acuity, density of communication with patients or team members, task and role ambiguity, and challenges imparted by the physical environment or equipment.<sup>1</sup> The impacts of stress on performance in emergency medicine are obvious: errors and delays in patient care, conflict between team members, poor patient experience, and longer-term issues such as clinician burnout.<sup>3</sup> Mitigating these impacts may be achieved through system changes (e.g., better staffing, better physical design), but a large burden of this mitigation falls on the clinicians' personal and team coping strategies. Our focus in this study is on stress in high-acuity patient care situations and the need for emergency clinicians to recognize and regulate their stress response to maintain high performance in the resuscitation room.

There is an emerging role for health care simulation as a tool for developing individual and team coping strategies under stressful conditions, building on its established role for enhancing individual skills and fostering teamwork. Termed "stress inoculation" or "stress exposure" simulation (SES), the technique draws on similar training approaches in military and other high stress teamwork contexts. Scenario designs aim to stretch clinicians to the limit of their coping abilities, within a realistic clinical challenge. Currently described approaches integrate knowledge and skills (behavioral and cognitive skills training) with application and practice,<sup>4,5</sup> but reflect expert opinion,<sup>6</sup> rather than empiric evidence.

Closer analysis of described SES sessions reveals a bias toward *individual* skills and coping strategies,<sup>7</sup> perhaps reflecting the personal 'mental toughness' that is a valued attribute in emergency medicine. However, *team*-based strategies to reduce the negative

impact of stress on performance are well described and effective<sup>8,9</sup>; yet, they have not been a focus for SES in emergency medicine. This is despite well-established simulation-based team training in emergency medicine, using principles of crisis resources management<sup>10</sup> and other established, usually behavioral, frameworks for team performance. We see an opportunity to explicitly apply this team training to recognizing and regulating stress in resuscitation rooms.

Following our review of relevant literature, it was clear that SES sessions require careful design, and a mature understanding of the role of emotions in simulation based education.<sup>2</sup> It is not simply a matter of 'throw them in and see how they cope.' Simulation practitioners should draw on the extensive guidance for recognizing and managing emotion that can be anticipated in any simulation-based learning.<sup>2,11-13</sup> However, scenario design, delivery and debriefing will have some important differences if triggering an emotional reaction is an explicit objective of the simulation. Pre-briefing and debriefing conversations before and after the scenario should support a 'safe not soft' approach,<sup>14</sup> where participants feel safe to explore team performance, the stressors impacting that performance, and techniques that helped. Careful attention should be paid to the levels of psychological safety that teams bring into the simulation from the workplace, and the risk and benefit of their experience in SES 'leaking out' to clinical practice.<sup>15</sup>

We aimed to optimize the design, delivery, and debriefing of SES in emergency medicine, through exploring participant experience of our current SES program and the transfer to clinical practice. We were specifically interested in training team-based approaches to the recognition of stress within ED teams performing in high-acuity patient encounters and mitigation of its impact on performance.

## METHODS

We performed an exploratory study with doctors and nurses participating in our ED SES sessions. We were guided by a three part conceptual framework offered by Dijkstra et al.<sup>9</sup> in their scoping review of teams under stress in nonmedical fields: the causes of stress, the impacts on team performance, and helpful team processes that mitigate this impact. These three elements of Dijkstra's model<sup>9</sup> informed our SES design and delivery and guided our exploration of participant experience using thematic analysis. In what follows we describe our context and methods and embed descriptions of our reflexivity and positioning as authors where this information is most relevant.

### Study context

Context is critically important in any educational intervention, and hence we describe our clinical environment and simulation context in detail, following published reporting guidelines for health care simulation research.<sup>16</sup>

The ED at Gold Coast University Hospital, a large tertiary referral hospital in Queensland, Australia. The ED census is 120,000

patients each year, including pediatrics and major trauma, and the unit is staffed by over 300 nurses and approximately 75 doctors. Simulation-based education and quality improvement is well embedded with the ED, with weekly simulation based educational session for trainees and nursing staff, monthly large-scale trauma and pediatric simulations involving the ED and other departments, and simulation-based elements embedded in other courses and educational activities within the ED.

The design, delivery and debriefing of our regular simulation-based activities are informed by published best practice and with oversight from the Medical Director of the Gold Coast Health Simulation Service (V.B.—PI for this study and emergency physician within the department) and a team of dedicated medical and nursing educators. This team includes simulation educators employed full time within the Gold Coast Simulation Service (all nurses, with experience ranging from 3 years to over 20 years within simulation), doctors undertaking 6- to 12-month positions as education or simulation fellows, a team of dedicated ED nurse educators, and a departmental simulation special interest group. Authors W.I., N.S., and E.P. have been members of this delivery team for more than 2 years, and their extensive experience with the context and participant group influenced design of both the SES sessions and the study.

Our regular weekly interprofessional simulation program is attended by four to six emergency medicine trainees with 3–8 years' postgraduate experience and eight to 10 registered nurses with experience ranging from new graduate to over 20 years' experience. All are rostered to attend as part of their employment. Scenarios are developed based on common and important ED presentations and responsive to current educational needs and quality and safety issues within the ED. Prereading relating to the clinical content of the scenarios is sent to participants 4 days before sessions. A typical 2-h session begins with a prebriefing that includes introductions, reiteration of session objectives, clarification of expectations of participants, and description of practical simulation constraints. Two scenarios are conducted, generally for 10–20 min, followed by a 20- to 25-min debrief. The scenario delivery may involve either mannikins or simulated patient actors. The simulation room is a dedicated space within the ED, not used for real patient care and set up like the layout of the ED resuscitation bays. Participants have similar equipment, medications, and investigations available to them as they would for actual patient care. A team of two doctors and four nurses are involved in each scenario, with remaining members of the group observing the scenario in the debrief room with an audiovisual feed. The debriefing is broadly conducted in line with the PEARLs framework,<sup>17</sup> with a focus on clinical issues, teamwork, and ED system. Medical and nursing facilitators have all undertaken dedicated training in simulation debriefing and operate within a codebriefing approach that includes a short peer feedback session after the main session concludes. Facilitators frequently discuss issues related to psychological safety with the faculty group and with participants.

## SES

The ED simulation program introduced SES sessions in 2020, to align with curricular domains specified by the Australasian College for Emergency Medicine,<sup>18</sup> and in response to increasing recognition of the need to train teams to perform under high-stress conditions. The SESs are one of several high-performance teamwork strategies initiated in our ED over the past 3 years. Others include morning huddles and “after action review” clinical team debriefings after high-acuity cases.

SES sessions are conducted every 2–3 months, and the format for the SES is like our regular simulation sessions in terms of location, format, attendees, and pedagogical approach, but with some important differences, based on our review of practice and literature.<sup>2,4–6</sup> Participants are sent prereading relating to the sources, impacts, and mitigators of stress in health care teams and clear expectations as to how the session will be conducted. Initial prebriefing includes reflecting upon and sharing current coping strategies as individuals and teams. Scenarios are designed and delivered to stretch the team to the edge of their ability to manage the clinical situation (Files S1 and S2). This includes high-acuity clinical content of the scenario as well as variable amounts of extraneous cognitive load, e.g., missing equipment, loud overhead announcements, and other distractions. Debriefing is structured to allow an initial “reactions” phase, followed by an “analysis” phase where doctors and nurses are supported to reflect on their performance. During the analysis phase, the conversation is structured according to the Dijkstra framework,<sup>9</sup> i.e., the sources and impacts of stress and the strategies that help. There is a strong emphasis on how these strategies can be translated back to practice in the resuscitation room.

A recent addition to the SES session has been the attendance of simulation practitioners from the Bond University Tactical Research Unit. R.O. and E.C. are co-authors for this study and have expertise in the science of human performance and experience in conducting SES for military and law enforcement personnel. In addition to their involvement in the session design, delivery, and debriefing, they offer the participants the chance to wear a biometric monitor (Equival EQ02 + LifeMonitor, AD Instruments) during the session to allow review and reflection on their physiological responses to the stress in the scenario. This is a voluntary adjunct to their participation.

## Data collection and analysis

Data were collected via surveys and interviews from participants. Doctors and nurses working in EDs were made aware of the study through an email message and through discussion at weekly education sessions. Those rostered to attend an SES session were invited to participate in the study and provided with information about their opportunities to participate in a survey, interview, and/or collection of biometric data. After the SES session, participants were emailed a link to the survey and contact details for EP if they wished

to participate in an interview. One reminder was sent a week after the initial email.

In the absence of validated instruments, survey questions (Table 1) were developed by the investigators, using concepts from literature relating to SES in emergency medicine and other contexts. Semistructured interviews (File S3) were performed by E.P., an emergency physician and anthropologist who works in this ED and who is familiar with both the design and the delivery of simulations, including SES, within our ED. She and V.B. have undertaken previous research on psychological safety in our ED and simulation program. Guiding questions were based on existing theory and practice in SES and further exploration of findings from the narrative surveys. Where possible, interview participants were given a copy of their personal human resources (HR) data to support reflection on their experience.

We analyzed narrative survey and interview data to identify themes. Our approach was iterative, with initial survey responses reviewed and informing subsequent data collection via interviews. Our thematic analysis was inductive, with investigators VB and EP undertaking initial coding independently and then meeting to generate draft themes and subthemes. Survey responses and interview transcripts were also reviewed by the rest of the author team who provided feedback on the draft themes. Although inductive in approach, our analysis was sensitized by current literature on how SES can be designed, delivered, and debriefed, and the three-part framework was used to structure debriefing with participants.<sup>9</sup>

Those participants who wore a biometric data sensor received their personal HR data via email after the session for personal reflection. For our study purpose, summary HR data were presented to individual participants who participated in interviews as a prompt for discussion. The study was approved by Gold Coast Hospital and Health Service Human Research Ethics Committee (Approval Number HREC/2021/QGC/79774).

**TABLE 1** Narrative survey questions.

- 1) What is your profession?
- 2) How long have you been working in emergency departments (GC or elsewhere)
- 3) Describe one or both of the scenarios at the SES session you attended. What caused you stress in the session? How does that compare to sources of stress in the (real) resus room?
- 4) What strategies were most effective at lowering your personal stress?
- 5) How did you know whether your other team members were stressed? What could you do to help them? Or what could they do to help you?
- 6) What strategies (personal or team) lessened the impact of the stress on your teams performance?
- 7) How did the prereading, prebriefing and debriefing affect your experience of the SES session?
- 8) What was the most useful part of the session?
- 9) What would you change about the session?
- 10) Describe something you might try next time you are feeling stressed in ED

## RESULTS

We report the experience of participants in three SES sessions conducted between November 2021 and August 2022. Overall, there were 23 total participants across the three sessions, comprising 12 doctors and 11 nurses. Three nurses participated in more than one session.

### Study participation

Sixteen participants (69.6%) completed the survey, with equal numbers of doctors and nurses. Of those completing the survey, 10 participants had more than 5 years' experience in emergency medicine, and six participants had between 1–5 years' experience. No one had <1 year of experience. Eight participants agreed to be interviewed, with equal numbers of doctors and nurses.

### Themes

Five themes were identified in data analysis, presented in Table 2 and discussed further here. Representative quotes provided here are attributed according to the study participant number and whether they were from interviews [I#...] or the narrative survey [S#...].

### Experience of stress

#### Sources of stress

Participants easily identified their sources of stress during the exercise. Some related to the challenging clinical content of the scenarios and associated time pressure.

Scenario—young patient, intubated, low GCS? cause. Obstructed misplaced ETT [S#2].

Others related to lack of familiarity with their role, team, or environment.

I felt more personal stress ... because I had to step up to a role that I am not normally comfortable with [I#8].

A powerful source of stress was the anticipation of participating in SES, including the prereading and prebriefing. Providing information about the nature of the simulation and literature relating to recognizing and regulating emotion in the resus room heightened that anticipation.

The prebriefing I felt was more stressful—I guess the anticipation of having a stressful experience is more stressful than going through it for me. It's like going on a roller coaster, the anticipation of a crazy ride versus enjoying the ride when it's happening [S#9].

**TABLE 2** Themes, sub themes and concepts identified in data analysis.

Theme	Subtheme	Concepts
Experience of stress	Sources of stress	Anticipation, pre-reading, clinical scenario, time pressure, team or role unfamiliarity, environment, equipment, pre-briefing
	Recognition of stress	Personal versus others, voice quality, body language, breakdown in teamwork
Managing stress	Personal strategies	Calm facade, clinical frameworks, cognitive aids, managing physiology
	Teamwork strategies	Team leader, role allocation and flexibility, communication, team familiarity
SES Design and delivery	Balancing challenge and psychological safety	Authenticity, trickery, pre-briefing
	Sim context	Prior simulation experience. Relationship between facilitators and participants
	HR monitoring	Prompting reflection. Recognizing stress
	Outsider perspectives	Validation, frameworks
Learning conversations/ Debriefing	Promoting shared understanding/insight	Terminology, frameworks, structure of discussion
	Personal reflection	
Transfer to practice		Teamwork, cognitive offloading, team familiarity

However, this was described as reflective of their experience in real-world practice.

This equally translates to a real resus room as usually the most stress for me personally occurs prior to the resus occurring, it is the fear of not knowing [I#5].

#### *Recognition of stress*

Participants described personal awareness of stress and their familiarity with that experience at work. However, they were also aware of the signs of stress in team members and the signs of that stress impairing team performance.

I could tell other team members were stressed by the loudness of communication, pressured speech, unnecessary flapping, and panic thoughts [S#8].

Volume in the room increased significantly decreased in closed loop communication and overall quality of communication. Breakdown of clear role allocation [S#16].

#### Managing stress

Participants described personal strategies that worked to regulate their stress response during the SES sessions, many of which were

honed in clinical practice. The use of structured frameworks and cognitive aids was frequently mentioned.

Box breathing, slow breathing, basically any form of recentering and focusing on internal breathing [S#12].

Referring back to guidelines and flow charts—particularly in the arrest situations. Taking a breath and returning to basic ABCs rather than trying to think about everything at once [S#16].

Actively maintaining a calm façade was recognized as a strong influence on the rest of the team.

As the team leader, knowing that my stress directly influences the stress and functional ability of the team forces me to maintain a calm facade for the betterment of the team, even if that is not how I truly feel [S#2].

The role of the team leader in managing team affect was reinforced by many participants.

then xxxx [team leader] read the room and just calmed it and then it quieted down ... So that was good that

he picked up on that tension in the room and knew that everyone was stressed again and then tried to mitigate that [I#8].

These strategies and skills formed a large part of the debriefing conversations. Although reported briefly here, these are typical of the conversations and learning we hope would occur in SES sessions.

## SES design and delivery

One of our primary aims with this study was to investigate the influence of SES design and delivery on participants learning about stress recognition and regulation. Participants valued clinical authenticity and the balance of maintaining both psychological safety and challenge.

I think having the prebrief and telling us that things were gonna go wrong almost helps. Helps me not get as stressed like we might have in a real situation. But I think yeah, it was certainly challenging" [I#4].

It was clear there were risks, and the context in which SES is delivered matters, including participants prior experience of simulation and the existing relationship between simulation facilitators and participants.

Certainly if I was a reg coming on to that for the first time as my exposure to sims at Gold Coast, I'd be not too keen on coming back [I#3].

The experience of one nurse who was also a cofacilitator captured the disquiet felt when our first sessions involved the use of trickery to amplify cognitive load.

We've built ... that psychological safety, that we're not trying to trick them and then all of a sudden, we're tricking them again into thinking like pulling by hiding things that makes them more difficult than they actually would be. I think it just kind of like detaches from like the authenticity that we can have like trying to create a realistic environment of a stressful situation and really see how they can apply that ... that these techniques and how they would react in those situations be much more applicable when they go back to work and might try to put these into practice" [nurse cofacilitator, I#7].

The involvement of the team from the Bond University Tactical Research Unit demonstrated the value of involving outside experts in discussion. These included new terminology and frameworks to help understand stress regulation and response, and also simple validation of the team's performance.

We're hearing what those guys who are invited guests thought. They said, Like you guys just really work as a team [I#8].

Individual recordings of heart rate monitoring provided some reflection prompts. No participants mentioned it as a source of stress or concerns during the session.

It sort of correlates with probably how I was feeling in terms of stress ... the initial stress of the tube and desaturating patient with a blocked tube and then maybe pulling the tube back and a heart rate probably went down then. And then as the patient continued to desaturate, and we were trying to troubleshoot that, then yeah, the heart rate was obviously climbing. ... Yeah. 160 [I#4].

## Learning conversations/debriefing

The debriefing conversations that followed SES scenarios were recognized as a vital part of the SES experience, both for personal reflection and for promoting shared understanding of stress regulation as a team.

It was very useful to sort of hear how other people all sort of were feeling throughout this scenario from a from a stress point of view, because I think it's not something we really talk about too often [I#3].

And I think the main difference between the way we approach that sim compared to the others is just how the discussion was framed [I#5].

Huge impact. Allowed the focus to shift from a poor patient outcome to the positive aspects of personal and team based behaviors [S#1].

These findings are not unique to SES and demonstrate the importance of adhering to generic principles of good simulation practice.

## Transfer to practice

Participants offered many examples of how the SES experience translated back to clinical practice. Some of these were clinical learning, such as learning to troubleshoot airway management under er pressure. More responses related to team familiarity and teamwork behaviors such as cognitive off loading and communicating about the affective state of the team.



I think, in general, the one thing that I've sort of taken away from it is making sure that I know who's going to be my resus team for a particular shift, especially coming on to nights [I#3].

Expressing vulnerability, normalizing feeling stressed but then stating that positive team behaviors are even more important in these situations and that we all need to look out for each other [S#1].

Attempting to reclaim the initiative, and involving others to offload some cognitive load [S#16].

One participant captured succinctly the idea that stress in the high-acuity ED environment is not something to be "inoculated" against, but rather recognized and regulated.

"Embrace it, crack on with it"

[S#15]

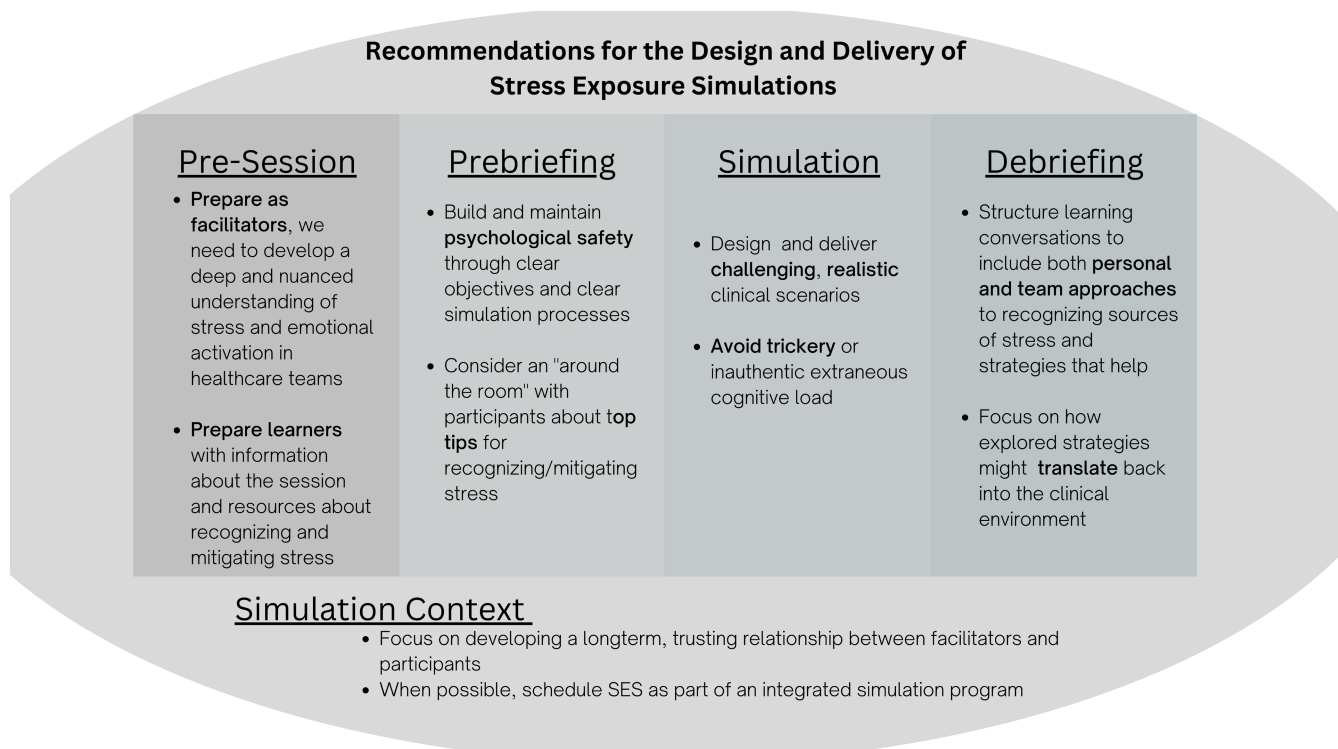
## DISCUSSION

Our aspiration was to provide the health care simulation community with empirical evidence on which to base the design of SESs. Our analysis of participant experience, and reflection on our own

experience as simulation providers, has reinforced the need for thoughtful design and delivery. Our results demonstrate that our carefully designed SES sessions afford participants useful reflection on the experience of stress in clinical scenarios, strategies to mitigate harmful impacts of that stress, and transfer of these concepts back to real-world practice. Participants also provided important perspectives on our SES design and delivery and emphasized the critical role of the structure, content, and tone of SES debriefing conversations.

Our exploration of participant experience in SES crystalized our deeper question: what is "good" SES? We realized that our underlying assumptions in answering that question included *transfer* of lessons learned to practice and the *safety and efficiency* of the simulation process in learning those lessons. Our findings highlight both similarities and important differences for scenario design, delivery, and debriefing and for learner preparation to that we might employ for SBE focused on clinical knowledge and skills. We offer [Figure 1](#) as a short list of recommendations for simulation practitioners planning to deliver SES session.

We were reassured to find that many accepted simulation practices worked well in SES sessions: clear objectives, learner preparation, careful scenario design and delivery, attention to psychological safety, and debriefing that explored experience and supported transfer back to real-world practice. We appreciate that our task was made easier by SES sessions being embedded within a well-established simulation program in our ED, where trust and relationships have been built between team members and with simulation facilitators.



**FIGURE 1** Recommendations for design and delivery of SES. SES, stress exposure simulation.

Our findings also called into question some of the practices commonly used in the delivery of stress inoculation simulation. Our most surprising finding was the lack of need to introduce trickery, distraction, or extraneous cognitive load into our SES scenario design. In the first two SES sessions these “tricks” were rarely identified as major sources of stress, nor were they perceived to help debriefing conversations. However, they did contribute to perceptions of lack of scenario authenticity by participants. The use of tricks also created a strong sense of unease for us as facilitators, and we were fearful of breaking trust that we had been so careful in building in our usual simulation sessions. Our emphatic recommendation to simulation practitioners is to present any realistic, challenging ED simulation case as a “SES scenario” and to rely on tailored prebriefing and debriefing conversations to frame, explore, and shape participant practice in the face of stressful resuscitation room encounters.

The second significant finding, that admittedly played into some of our biases was that the main mitigating strategies participants relied on when faced with stress were *team-based*, rather than *individual-focused*. Most participants identified that recaps, team-familiarity, cross-monitoring, and other team strategies were used to manage stress in the moment, consistent with research from team science literature.<sup>19</sup> Our groups identified that performance was linked to the ability to effectively distribute stress within their team and reflected on problematic mismatches. The nature of the conversation was summarized quite simply in one of the participant's reflections at the end of a session, “If you feel like you need to do box breathing, maybe you should just tell someone.” This finding is interesting for clinical teams but also critical for the design and delivery of SES. Providing authentic team challenges and stress across all roles rather than focused on a single individual is likely more transferrable and relevant to everyday practice.

Our final reflection relates to the problematic terminology of stress inoculation training used by some authors. This arguably reinforces a perception that stress is something to be *exposed to* and *inoculated against* so that it is *removed* from practitioner experience. We suggest that a more nuanced understanding is required for simulation facilitators and for the emergency clinicians who are our SES participants. We have drawn upon the work of LeBlanc,<sup>1,2</sup> Morgenstern,<sup>20</sup> and others in our SES design and in discussions with participants; “stress” is a multifaceted construct and needs to be *recognized* and *regulated* to enhance individual and team performance. We suggest “stress exposure training” should be the preferred terminology.

## LIMITATIONS

We appreciate that participant experience is only one of several elements that may inform the design and delivery of SES. Other measures of SES effectiveness such as real-world performance are beyond the scope of our study. Our data analysis and discussion are influenced by our positioning as facilitators of these sessions, and combined experience of many years of simulation practice. We

consider this a strength of this study and have reflected upon our reflexivity throughout the results and discussion.

## CONCLUSIONS

We offer this exploration of participant experience to inform optimal design and delivery of stress exposure simulations. We suggest that the approach should draw upon health care simulation best practice, with stress adequately induced by authentic clinical scenarios and to avoid trickery or adding extraneous cognitive load. Those leading learning conversations in SES sessions should develop a deep understanding of stress and emotional activation and their relationship to performance in health care contexts. We further suggest that most emphasis in these conversations should focus on team-based strategies to mitigate harmful impacts of stress on performance, with a smaller role for individual strategies.

## AUTHOR CONTRIBUTIONS

Victoria Brazil and Eve Purdy led study design, data collection, and manuscript preparation. Warwick Isaacson and Nikki Stevenson supported the delivery of SES sessions and participated in data analysis and manuscript review. Robin Orr and Elisa F.D. Canetti supported data collection and participated in data analysis and manuscript review. The authors read and approved the final manuscript.

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## CONFLICT OF INTEREST STATEMENT

VB is Medical Director of the Gold Coast Health Simulation Service. She is also Director of the Bond University Translational Simulation Collaborative, which undertakes paid consultancy work in health-care simulation. The other authors declare no potential conflict of interest.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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