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Multidisciplinary simulation training for Australian perioperative teams: A qualitative descriptive exploratory study

Abstract

Background: Perioperative units are complex and high-risk environments in which teams of multidisciplinary health care professionals work collaboratively. Multidisciplinary simulation training is a form of education that allows perioperative teams to practise the non-technical and technical skills essential for managing emergency events within the perioperative environment. Despite the benefits of multidisciplinary simulation training, there is a paucity of literature about it; therefore, this study examined the experiences of Australian multidisciplinary perioperative team members who had undertaken simulation training.

Objectives: This study examined the experiences of Australian multidisciplinary perioperative team members who had undertaken multidisciplinary simulation training with the aim of:

1. identifying the enablers of and/or barriers to multidisciplinary simulation training
2. gaining insight into the frequency of training and types of scenarios used during simulation training
3. exploring the potential changes to teamwork and communication following multidisciplinary simulation training.

Design: A qualitative descriptive exploratory design was adopted.

Methods: Data were collected from nursing and anaesthetic participants through individual interviews using a semi-structured interview guide. Interviews were recorded and transcribed, and data were analysed using thematic analysis.

Results: Four themes and nine subthemes were identified within the data. The themes were simulation is educational, safe space, frequency and teamwork. The subthemes were emergency scenarios, practise skills and knowledge, training novice and inexperienced staff, fear of simulation, facilitators, debriefing, available facilities, staff availability and multidisciplinarity.

Conclusion: Australian perioperative teams widely used multidisciplinary simulation training to practise the technical skills needed to manage emergencies consistently. However, the frequency was variable and dependent on the availability of staff and facilities. A 'safe space' was vital, allowing perioperative team members to engage in training and discussions without judgement or embarrassment. Multidisciplinary simulation training is an effective training technique and should be routinely undertaken by Australian perioperative teams to develop consistency in managing emergency events within the perioperative setting.

Keywords: interdisciplinary, multidisciplinary, operating room, perioperative, simulation training, qualitative.

Background

The perioperative unit is a dynamic, complex and potentially high-risk environment that requires multidisciplinary teams to work interdependently and collaboratively to provide the multifaceted care required by perioperative patients[1,2] Care of the perioperative patient extends from the pre-operative phase, through the intra-operative phase to the post-operative phase. It occurs in various settings, including ambulatory surgical settings and in-patient hospital units.[2,3] Multidisciplinary perioperative teams consist of a range of health care professionals including but not limited to nurses, anaesthetists, surgeons, theatre technicians and anaesthetic technicians as well as other ancillary staff such as radiographers and theatre clerks.[4,5]

Unfortunately, the very nature of the multidisciplinary team can present barriers to the safe provision of care for the perioperative patient. Dysfunctional teamwork and breakdowns in communication can be influenced by several factors and contribute to poor patient outcomes.[4,6] Professional rivalries, disciplinary silos and professional hierarchies stemming from historical perioperative team structures negatively impact effective teamwork and communication and, therefore, safe perioperative patient care.[1,4,7,8] Simulation training undertaken by multidisciplinary perioperative teams has been identified as an effective training method to improve teamwork and communication.[1,9]

Multidisciplinary simulation training is widely used within health care to allow teams of nursing and medical professionals to practise and refine the non-technical and technical skills required to care for patients during emergencies.[1,9] Anaesthetists were early adopters of simulation training, adapting this form of education from industries such as the maritime, nuclear and aviation industries.[10–13] Simulation training is widely used in multiple health care settings, such as emergency, intensive care, obstetric and perioperative units.[5,11,12,14] Within the perioperative unit, simulation training uses scenarios based on actual clinical events and emergencies to allow health care professionals to practise non-technical and technical skills needed to manage such events. These scenarios included but were not limited to cardiac arrest, massive haemorrhage, anaphylaxis, management of difficult airways and infrequent occurrences such as malignant hyperthermia.[11,15–17] Furthermore, simulation training allows systems and processes to be tested within the perioperative unit and improves perioperative patient safety.[1,11,16,18]

Effective learning from simulation training relies on key factors such as high fidelity and debriefing. High-fidelity simulation training is achieved through using life-like mannequins and realistic roles, and ensuring the simulation environment reflects the clinical environment and scenarios reflect clinical events.[13,19] This is particularly important if simulation training is held off-site in a dedicated simulation centre rather than the clinical space in which perioperative teams would typically practice. Another key factor of simulation training is debriefing after the simulation training. Debriefing provides a safe forum for team members to reflect on their experiences and allows the team to consolidate their learning. Effective debriefing facilitated by trained staff can result in the transfer of new knowledge to the clinical setting and also provides an opportunity for perioperative team members to de-stress following simulation training.[5,20–22]

An essential function of simulation training is allowing perioperative teams to learn, practise and improve their non-technical skills. Non-technical skills encompass interpersonal and cognitive factors such as teamwork, communication, collaboration, situational awareness, decision-making, delegation and leadership.[4,5,23] Non-technical skills are interdependent and closely interrelated. For example, teamwork is reliant on collaboration between team members and requires effective communication. Additionally, effective task delegation, decision-making and leadership require effective communication. Furthermore, situational awareness during an emergency is essential for effective leadership to enable team leaders to delegate tasks and make decisions about the care of the patient.[4,24,25]

Traditionally it was assumed that teams of health care professionals would become competent in non-technical skills without formal training. However, ineffective teamwork and communication have been major contributing factors to adverse patient outcomes across all health care settings.[7,8] Professional rivalries and hierarchies can influence breakdowns in communication and teamwork. Furthermore, interruptions, fatigue and stressful emergencies are compounded by ineffective communication and teamwork.[7] Simulation training provides multidisciplinary perioperative teams with a safe and controlled space where non-technical skills can be learnt, practised and improved without causing patient harm.[5,23]

While proficiency in non-technical skills is important for safe perioperative patient care, multidisciplinary teams must also be proficient in the technical skills needed to manage emergency

events. Technical skills encompass the clinical knowledge and physical motor skills required to perform specific clinical tasks.[12,16] Within the perioperative unit, these include the knowledge and skills needed to manage a difficult airway, resuscitate patients in cardiac arrest and perform a cricothyroidotomy in a can't intubate, can't oxygenate situation.[16,23] Multidisciplinary simulation training allows perioperative teams to learn, practise and improve the clinical knowledge and physical motor skills needed to manage emergencies without causing perioperative patient harm.[12]

Additionally, simulation training enables perioperative teams to test physical systems and processes, and assess the preparedness of the perioperative environment for managing emergency events.[26,27] Testing physical systems and processes includes examining workflow and assessing vital equipment and resource availability within the perioperative unit. Simulated scenarios can be repeated after necessary changes have been identified and made to test the changes.[26,27]

Despite the identified benefits of simulation training for perioperative teams, there are barriers to the organisation and facilitation of simulation sessions – significantly, cost and time. Simulation training programs can be costly to organise and facilitate. Trained facilitators are required to run simulation training, and educating facilitators can be costly.[22,28] Furthermore, costs associated with simulation training can be compounded by lost operating time and the cost of wages paid to staff undertaking the simulation training. Simulation training programs can also be time consuming to set up, and staff have limited time to attend simulation training due to clinical services being prioritised over education and training.[29,30]

Following an extensive review of the literature, it was identified that there is a paucity of literature on the experiences of Australian perioperative teams who have undertaken multidisciplinary simulation training.[31] The extent to which simulation training is utilised by Australian perioperative teams and the frequency of such training is relatively unknown. Furthermore, the effect on non-technical skills such as teamwork and communications and the barriers to and enablers of this training method needs to be clarified. This study examined the experiences of Australian perioperative team members who had undertaken multidisciplinary simulation training and sought insight into aspects of the training.

Methods

Research question

What are the experiences of Australian multidisciplinary perioperative team members who have undertaken multidisciplinary simulation training?

Objectives

This study aimed to:

1. identify the enablers of and/or barriers to multidisciplinary simulation training for Australian perioperative teams
2. gain insight into the frequency of training and types of scenarios used during simulation training undertaken by multidisciplinary Australian perioperative teams
3. explore the potential changes to teamwork and communication following multidisciplinary simulation training for Australian perioperative teams.

Methodological approach

A qualitative descriptive exploratory approach was used to produce an in-depth summary of the experiences of Australian perioperative team members who had undertaken multidisciplinary simulation training.[32]

Participant recruitment

A combination of purposeful and snowball sampling was used for this study. Initially, the Tasmanian perioperative nursing association (Australian College of Perioperative Nurses (ACORN) Tasmania) was approached to distribute a flyer (see supplemental material 1) to their members via email. Potential participants emailed the researcher and were screened for suitability against the selection criteria using the participant recruitment questionnaire (see supplemental material 2). A total of three participants were recruited over four months. Snowball sampling was used due to the small number of participants recruited, and a further participant was recruited using this method. Recruitment of participants was expanded Australia-wide through ACORN, the national perioperative nursing body. Flyers were emailed to ACORN members and a further four participants were recruited for the study.

Participants

Eight participants were recruited for this study – seven nurses and one anaesthetist. All participants have participated in simulation training within an Australian perioperative unit in the last five years. The participants from the nursing profession had undertaken various roles within the speciality of perioperative nursing, including instrument nurse, circulating nurse, anaesthetic nurse and

Table 1: Participant demographics

Participant	Registration	State	Sex	Position	Specialty	Experience
Participant 1	Registered nurse	Tasmania	Female	Perioperative registered nurse	Anaesthetics and PACU	>20 years
Participant 2	Registered nurse	Tasmania	Female	Clinical nurse educator and quality management	Instrument and circulating nurse	>39 years
Participant 3	Doctor	Tasmania	Male	Anaesthetist	Anaesthetics	<10 years
Participant 4	Registered nurse	Tasmania	Female	Perioperative registered nurse	Anaesthetic nurse	<10 years
Participant 5	Registered nurse	Queensland	Female	Perioperative registered nurse	Generalist perioperative nurse	>20 years
Participant 6	Nurse practitioner	Queensland	Female	Nurse practitioner	Cardiothoracic nurse practitioner	>30 years
Participant 7	Registered nurse	Victoria	Female	Clinical nurse educator	Generalist perioperative nurse	>20 years
Participant 8	Registered nurse	Victoria	Female	Nurse unit manager	Paediatric instrument and circulating nurse	>10 years

Post Anaesthesia Care Unit (PACU) nurse. Five participants were current or previous clinical nurse educators who had been or were still actively involved in organising and facilitating simulation training within their perioperative units. Participant demographics are presented in Table 1.

Data collection

Data were collected by the primary author via individual interviews with participants using a semi-structured interview guide (see supplemental material 3). Interviews were conducted online, at a predetermined date and time, and lasted for an average of 35 minutes. Interviews were recorded with the participant's permission and later transcribed using Descript™. Transcripts were checked manually against the recorded interviews for accuracy and quality.

Data analysis

A thematic analysis of the data was carried out by a single researcher guided by Braun and Clarke's six-phase process to analyse the data.[33] Initially, transcripts were reviewed and notes were made against sections of the participant narrative which were of interest and potentially relevant to the research questions. These notes became the initial iteration of codes and were listed within a coding table as iteration one. These initial codes were reviewed and refined to become the second iteration of codes. Participant transcripts were reviewed again to identify further codes across the data set. Any new codes and corresponding participant narratives were transferred to the coding table under code iteration three. Code iterations two and three were reviewed and refined to produce the fourth iteration of codes. Following the initial identification of codes within the data, all codes were reviewed, discarded and/or combined in three further iterations (see supplemental material 4). Asterisks (*) were used to indicate the prevalence of these codes for each participant and across the entire data set to help identify tentative subthemes and themes. A complete list of subthemes and themes was developed and listed with the relevant codes (see supplemental material 5).

The lists of subthemes and themes were reviewed against the research question, aims and objectives and their relationship to each other. Subthemes and themes were kept or discarded, as appropriate, and themes became subthemes, as necessary. Themes were constantly reviewed while writing up the findings and, at all stages, the participant narrative was reviewed to ensure the codes, subthemes and themes accurately represented

the data. Participant narrative was also checked against recordings to ensure accuracy, and any narrative presented was edited to remove repeated words and pauses, indicated in text as ellipses (...).

Trustworthiness

Lincoln and Guba's[34] four criteria of credibility, transferability, dependability and confirmability, were used to establish the trustworthiness of this research. Credibility was established by engagement with the research participants and prolonged engagement with the research data through the thematic analysis process. Transferability was achieved by providing thick descriptions of the participants, research methods and findings to enable perioperative team members to judge the transferability of findings to their settings. Dependability is established by providing a clear and logical description of the research methods. Confirmability is achieved through a comprehensive record of the steps used during thematic analysis and the presentation of findings. Thus, the trustworthiness of this study is demonstrated.

Ethics

Ethics approval was granted through the Tasmania Health and Medical Human Research Ethics Committee H0023989. Participant consent was gained before participation in interviews. Participants were provided with a participant information and consent form by email, and a signed copy was returned to the researcher before the interviews were scheduled. Participants were notified of their option to withdraw from the study at any time before, during or after the interview. Consent to participate and record interviews was confirmed at the start of each individual interview.

Recorded interviews and transcripts were stored on password-protected hard drives and within cloud storage provided by video conferencing and transcription software. Codes were used to create file names which would deidentify participants and code keys were stored in separate folders on password-protected hard drives. All data, including transcripts, recorded interviews and code keys, were backed up each week to the University of Tasmania's research data portal. Upon completion, the data was archived within the portal. All data kept in the cloud storage and password-protected hard drives were deleted. All data stored within the University of Tasmanian's research data portal is stored in perpetuity. All participants are assigned a pseudonym within the findings to deidentify them and maintain confidentiality.

Results

Four themes and nine subthemes were developed from the research data and are presented in Table 2.

Table 2: Themes and subthemes

Themes	Subthemes
1. simulation is educational	emergency scenarios practise skills and knowledge training novice and inexperienced staff
2. safe space	fear of simulation facilitators debriefing
3. frequency	available facilities staff availability
4. teamwork	multidisciplinary

Theme 1: Simulation is educational

Simulation training is predominantly used to educate perioperative teams. Importantly, learning points gleaned from simulation training should be used for education and not for performance assessment, as one participant noted (see Table 3).

Emergency scenarios

Multidisciplinary simulation training allowed perioperative teams to be exposed to emergency scenarios in a controlled and safe environment without harm to patients. The most commonly used emergency scenarios were basic and advanced life support. However, other emergency events were also used, and these focused on both anaesthetic and surgical emergencies.

The rationale for the choice of scenarios varied. Some scenarios were chosen due to staff requests, while others were chosen to review adverse events. One participant identified guidelines from the Australian and New Zealand College of Anaesthetists (ANZCA) which were used to meet training and education requirements (see Table 3).

Practise skills and knowledge

Participants recognised the need to practise the management of emergency events due to the rarity of these events within the clinical setting. Furthermore, practising regularly increased the confidence of experienced perioperative staff in managing emergency events (see Table 3).

Training novice and inexperienced staff

Simulation training was also a valuable tool for training novice and inexperienced perioperative staff. This training was deemed essential if staff were about to work shifts outside of regular operating hours when more experienced staff would not be available to assist in emergencies (see Table 3).

Table 3: Simulation is educational (Theme 1)

Subtheme	Key points	Participant narrative
	Simulation is educational	'They are learning points as opposed to they're criticisms of … performance.' (Participant 3)
Emergency scenarios	Basic and advanced life support scenarios	'So basic life support is a requirement for everyone. The advanced life support is a requirement for anaesthetic services staff and some other interested people.' (Participant 2)
		'… and mostly what we've done is … ALS [advanced life support] type simulations … or something like an anaphylaxis where you end up with … hypertension progressing to arrest potentially … this year, I haven't done too many airway ones.' (Participant 3)
		'… you know, airway issues … we do those … and obviously basic life support. Ah, in our situation … advanced life support.' (Participant 1)
		'I've also done stimulation training … for a program called CALS (cardiac advanced life support) …' (Participant 6)
		'… and we'd start with … usually the ALS scenario … VT [ventricular tachycardia], VF [ventricular fibrillation] … you know, brady adding pacing and so forth to meet ALS requirements and then we'd move into periop specific …' (Participant 7)
	Anaesthetic and surgical emergency scenarios	'… massive blood transfusion is another one …' (Participant 2)
		'… front of neck access is a good one from an anaesthetic point of view … liver lacerations, another one that we did … We did a bleeding IVC [inferior vena cava] from a trauma.' (Participant 4)
		'… we were at an obstetric hospital as well, so … PPH [post-partum haemorrhage] and massive transfusion was one … we did a code grey on a father, simulated that … MH [malignant hyperthermia] I think is done.' (Participant 7)
		'There's a respiratory arrest. And then … that might proceed to ECMO [extracorporeal membrane oxygenation] … and we also do a couple of big trauma scenarios … as well, you know, scenarios that we often find in the news … a child drowning … a car accident.' (Participant 8)
	Rationale for choice of scenarios	'There is a list and … it's done by … popular requests. As in, we will survey staff … about what they like to see. Partly it comes from M and M [morbidity and mortality] meetings …' (Participant 4)
		'So … the college of anaesthetists has … four scenarios that it considered to be crisis, sort of … there's critical airway management and there's major haemorrhage that are four crisis scenarios that they … expect us to keep up to date with over the period of … CPD [continuing professional development] training …' (Participant 3)

Table 3 (continued): Simulation Simulation is educational (Theme 1)

Subtheme	Key points	Participant narrative
Practise skills and knowledge	Practise skills required for emergency events	'… I think sim [simulation training] is mostly about immersion in order to practise the things that you don't actually get to practise in the roles you usually do.' (Participant 3)
		'And for me, I guess it's an opportunity to go through something before it might happen in real life.' (Participant 4)
		'Yeah, I think it would be more just practising certain skills. Ah, I guess when you're in a regional centre, you're not exposed to, you know, some of those things that you may come across more often.' (Participant 1)
		'You don't know what you need until you're in the situation and, yeah, unless you've got a lot of vascular or cardiac experience, then you don't know what you need, full stop.' (Participant 6)
	Increased confidence	'Yeah, definitely a hundred percent … because it's as close to real life as we can make it, I think that really helps people with their confidence. That if this happened right now or tomorrow or next week, In a real-life situation, I know where that anaphylaxis box is now, I know where that thing lives, I know what colour tubes to get out …' (Participant 4)
		'I think it improves your confidence, unbelievably, like … even doing ALS, you know, before the scenarios come up, everyone's a bit nervous. And then everyone feels really good and empowered afterwards because they're like, yeah, I nailed that. You know, you practise anything, you're going to feel better about it, and if you feel better about it, your confidence is improved.' (Participant 6)
		'I'd say my confidence has increased after … it does improve their skill and confidence in dealing with situations' (Participant 1)
		'So you don't usually have crises, so you may as well practise your crises here … and if you get to practise them and it makes you feel a bit more confident about not having missed anything and having gone through things … and perform well, then you feel good.' (Participant 3)
Training novice and inexperienced staff	Training novice and inexperienced staff	'… we have them programmed into our training for obviously new staff, particularly when the anaesthetic trainees … rotate around. We do try to get our … newer staff members or established staff members who are new to paediatrics … for emergencies before we put you on … we do like all of our new staff before they rotate onto after-hours …' (Participant 8)
		'… we'd like to do something like that on a small scale, have a dedicated training theatre, also for our new staff coming through, graduate nurses who are new to the environment.' (Participant 4)
		'… especially for the younger nurses that have not worked in a bigger trauma centre.' (Participant 5)
		'… and because we do have, I guess, with all of Australia at the moment, a less experienced workforce … you know, they are trying to get our less experienced workforce exposed to things …' (Participant 1)

Table 4: Safe space (Theme 2)

Subtheme	Key points	Participant narrative
	Simulation training must be a safe space	'… there should be a safe environment to practise what you want to do and how you do things.' (Participant 3)
		'Afterwards, even in a safe environment – and I think that's probably the biggest thing – people are so, so worried about doing something wrong that will really alter the patient's outcomes, that having this opportunity to go, hey, you know, if I stuff up … it's not the end of the world … and making sure that we've got the right people involved – the right anaesthetists, the right surgeons – who will be supportive about the training environment and, yeah, definitely help.' (Participant 4)
		'But what I took away from it, the most is … it's a debriefing … the way we approached it, we realised that because it was, it was in a safe environment … So I've done a lot of … debrief with the staff there as well, and … I think the fact that people were allowed to speak up in a safe environment regardless of their status or, or profession …' (Participant 5)
Fear of simulation	Participants were fearful of simulation training	'I mean, simulation training, I'm sure, puts the fear of God in some people, but I think it is really worthwhile.' (Participant 6)
		'Whereas at the beginning they will just look a bit terrified.' (Participant 3)
		'… and another barrier is people were afraid of sim so when I arrived as an educator …' (Participant 7)
		'Yeah, absolutely. The first … couple of times there were some people who were really anxious, and there was a huge level of nervousness around it and … almost afraid to just do what they normally do on a day-to-day basis.' (Participant 5)
	Reluctance to participate	'And I also think people are quite threatened by simulation training because they don't appreciate that it's a learning experience and nobody's going to look stupid. But I think there is a bit of resistance from people in that they think that they're not experienced enough or that other people are going to think that they don't know what they're doing or …' (Participant 6)
		'I think … you know, sometimes if you're working outside of a group of people that you're not familiar with, you can be put in, into that situation and in that spotlight and potentially making a mistake, which we are, you know, you're there to make mistakes so you can learn it … yeah, that can be something that people don't feel comfortable with … So it's, I guess that's that individual feeling of incompetence in that situation … like there's always that little sense of … you know, am I going to make an idiot of myself in this?' (Participant 1)
	Fear of simulation reduced through participation	'… by just doing it more and more … they felt more comfortable.' (Participant 5)
		'Yeah, I think by the time that debrief comes around, you know, everyone's gotten over their … anxiety about the situation … But yeah, I think by the time the debrief occurs everyone's relaxed and, well. relaxed that it's over to begin with.' (Participant 6)
		'And yes, it's clear, some are more reluctant participants than others … but … I feel like, at the end of a simulation session, often there's a lot more discussion … than there is at the beginning. So people just sort of start … all of a sudden they start opening up and asking questions and they look engaged and interested. And then … by the end of it, just, the feedback is usually positive. Both in the actual session and from the educators who feedback about participation afterwards.' (Participant 3)

Table 4 (continued): Safe space (Theme 2)

Subtheme	Key points	Participant narrative
Fear of simulation	Simulation needs to be a positive experience	'And that took a lot of work to change that culture. To say, hey, you know, education is not punitive. I'm not here to highlight what you don't know … ' (Participant 7)
		'… I think there's plenty of ways you can screw up people in sim … I don't run it as though it's an assessment. It's not, there are no criteria that you have to perform to.' (Participant 3)
		'It's not telling, you know, someone off or that they did the wrong thing … each person has their opportunity to give feedback for others … and it's spelt out that it's sort of a learning exercise and then it's confidential and, you know, it's not personally attacking anyone.' (Participant 8)
		'Yeah. And I guess everyone needs to work, walk away from the simulation feeling good about themselves.' (Participant 6)
Facilitators	Facilitators are important in creating a safe space	'I mean, the worst thing that a facilitator can do is make people feel … it's more about their performance … I've had some fantastic facilitators over the years and, you know, they make all the difference in putting people at ease and making a bit of a joke about the situation before we start.' (Participant 6)
		'I think they're quite comfortable to speak up because it is being run by the simulation team … who are very good at making sure it's a comfortable … environment. And from a teaching perspective, I think if it was … run by the individual … or facilitated by the individual … doctors and, and those sort of things, or people you work with, you may not be as comfortable …' (Participant 8)
		'There's no boss in the room, except for the facilitator, obviously, driving it … and the facilitator driving it is definitely the most important thing. I think that person just needs to steer the conversation … and give everybody a voice.' (Participant 4)
		'… because there are caveats in what we do. It's not a perfect system. It's not … giving you a perfect human. The interactions are all very difficult … you didn't do anything at all. You stood there five minutes while the patient was in VF. Tell me about what you thought … Often they've got a reasonable answer for that, that you can talk about, as opposed to … make them feel stupid because I don't think my making them feel stupid will ever help anyone.' (Participant 3)
		'I realised if you … that's the first and most important thing, just build trust and make people feel safe to speak up.' (Participant 5)
	Facilitator set rules to maintain the safe space	'And after a couple of false starts, we made sure the rules were really, really clear about it. About no … no names, no naming names, no blaming. Outside of this room, sort of thing.' (Participant 4)
		'… the way we debriefed … actually we had … we developed a template. So we always went through the same steps and everybody could fall back on the steps.' (Participant 5)
	Improperly trained facilitators could be harmful and facilitators require formal training	'I'm an educator. I can do it. No, the risk of harm is so great in simulation that I don't think it's something you can just wing. You can't … I look back on when I started and I know I made mistakes. I was judgmental without meaning to be …' (Participant 7)
		'Yes, absolutely, they need to be trained. Absolutely. … I've known of educators who go, "oh, just give it a bit of a go" and in they go, and it's disastrous. You know … I think a lot needs to change in nurse education. In the operating theatre who trains the trainers doesn't happen unless …' (Participant 7)

Table 4 (continued): Safe space (Theme 2)

Subtheme	Key points	Participant narrative
Debriefing	Debriefing is a key component of simulation training	'… the scenario itself might take 15 minutes or so, depending on how far they go on and how well they're responding and instructions at the start, obviously. And then, yeah, that half an hour for debrief.' (Participant 4)
		'So, we always debrief after, whether it's a reopening postop simulation or whether it's an ALS course or whether it's a CALS course.' (Participant 6)
		'My predecessors never did them, but we would always do a debrief, and I think by doing that and allowing everybody to speak up … people were also able to deal with emotions much better … You'll make mistakes, but it's just the debriefing and that's where the learning comes from. And … I think the fact that people were allowed to speak up in a safe environment regardless of their status or, or profession …' (Participant 5)
		'And then at the end of it … the debrief will go on for at least as long as the simulation … And that the things that come out of any debrief, I usually attempt it mostly positive … Positive team interaction discussions … happy to talk about the things we could have done better, but keep in mind that … we are probably going to be better at the end of this than at the beginning of this. That's the whole point.' (Participant 3)
	Facilitators are responsible for maintaining a safe space during debriefing	'… I think it did when I first started running the program, people were quite reticent to speak up because they didn't yet know that it was a safe learning environment … but by the end of it, we had some really robust discussions. I think a lot of it had to do with their faith in me … to be non-judgemental, but also to manage the room … So they have to have faith in me that I would manage these awkward conversations that came up. And it just, it takes time to establish that culture. (Participant 7)
		'… but that had to grow … the first couple of times it was very awkward and it was silences and nobody dared speak up. So I think creating that trust was really important. And then the learnings were so much more valuable as well.' (Participant 5)

Theme 2: Safe space

Participants commented that simulation training needed to be perceived as being held in a safe space (see Table 4). A safe space was an environment in which perioperative team members felt supported, somewhere they could make mistakes without judgement and fully engage in discussions.

Fear of simulation

Perioperative team members sometimes feared simulation training, and this presented a barrier to participation. Conversely, some participants did not fear simulation training but were still reluctant to participate as they wanted to appear competent in front of colleagues. Participants reported a reduction of fear through participation in simulation training. As perioperative team members participated in simulation training, they felt more comfortable and became more engaged in the simulation training process. Overall, participants felt that it was important for simulation training to be a positive experience, and perioperative team members needed to feel good following simulation training. Above all, simulation training should not be punitive (see Table 4).

Facilitators

An important aspect of simulation training was having facilitators who created and maintained a safe space during simulation and debriefing. Perioperative team members needed to be able to trust that facilitators would be supportive and non-judgemental and set the ground rules for simulation and debriefing. Despite the perceived importance of the facilitator's role, no formal training is required before educators run simulation sessions. Poorly trained facilitators could harm simulation participants and the entire simulation training process (see Table 4).

Debriefing

Another important aspect of simulation training is the debriefing session. Debriefing occurs at the end of simulation training and often runs for a longer time than the simulation scenarios. Debriefing allowed perioperative team members

to discuss the scenario, identify what went well and what could be improved and learn from mistakes made. Adequate engagement and discussion by perioperative teams during debriefing required the facilitators to maintain a safe space (see Table 4).

Theme 3: Frequency

The frequency with which simulation training sessions were held for Australian perioperative teams was variable. Some training sessions were held on an opportunistic and impromptu basis, while others were built into rosters and regular training and education schedules.

Participant opinions varied as to the ideal frequency for conducting simulation training; however, more frequent simulation training was identified as important for retaining knowledge. Furthermore, the availability of staff to attend simulation training influenced the frequency of sessions and, as such, more frequent simulation sessions would enable all staff to attend. Regular simulation sessions enabled perioperative staff to retain the skills and knowledge gained, and adequate retention of knowledge was important for nursing and anaesthetic staff to manage emergencies competently (see Table 5).

Available facilities

The availability of a physical space in which to run simulation training also influenced the frequency with which simulation training could be conducted. In the absence of a purpose-built simulation centre, the ability to run simulation training required theatres to be empty, which meant a pause in clinical services. Cancelled theatre lists created a space for simulation training, alternatively, facilitators needed to book a space within an otherwise empty theatre. However, clinical services always maintained priority, and if an empty theatre was needed for an operating list, then simulation training was cancelled. Although scheduling simulation training enabled physical space to be made available, there was still competition for theatre space, not from elective lists but from other training sessions (see Table 5).

Hospital administration and management could be a barrier to and/or enabler of running simulation training. Unsupportive administration and management would lead to simulation training being cancelled. In contrast, a supportive manager enabled simulation training as they provided physical spaces, staff to attend training and some equipment (see Table 5).

While booking an empty theatre for simulation training enabled the training by providing a space, the training could be further enabled by scheduling it as part of regular training. Scheduling training secured not only the facilities to run simulation training but also the staff to attend. Participants identified that the ideal time for running simulation training was in the morning before operating lists commenced. However, for one participant, this was not ideal as fewer staff were available in the morning (see Table 5).

Staff availability

The availability of staff also posed a barrier to simulation training. Despite the efforts to roster staff to attend simulation training, staff availability was still ad hoc and staff were less available when operating lists were running. If training and education were prioritised by management, this enabled simulation training. Participants identified protected time as a potential solution to staff availability. Protected time would allow staff to dedicate their time to simulation training as lists would be paused (see Table 5).

Theme 4: Teamwork

Simulation training undertaken by Australian perioperative teams strengthened the team and improved teamwork overall. Participants felt the perioperative team became more cohesive, and they were able to become familiar with each other and the roles they undertook during an emergency. Confidence in each other's knowledge and skills also improved through simulation training, and having a social component during debriefing was seen as important (see Table 6).

Multidisciplinary

Although deemed to be multidisciplinary, simulation training undertaken within Australian perioperative units did not always involve the entire perioperative team. Simulation training was predominantly facilitated by anaesthetists, and they were more likely to attend than surgical staff. Facilitators and participants also felt that it was easier to commence simulation training programs by focusing on anaesthetic emergencies (see Table 6).

The involvement of surgeons in simulation training varied. Some surgeons were very proactive and supportive of simulation training, especially if it involved training for new procedures and equipment. However, in some instances during multidisciplinary simulation training, there still appeared to be a divide in the perioperative team (see Table 6).

Table 5: Frequency (Theme 3)

Subthemes	Key points	Participant narrative
	The frequency of simulation training was variable and held on an impromptu and opportunistic basis	'I think we've got eight slots booked with our theatre educators for the 12 months.' (Participant 3)
		'I do ALS once every 12 months and I do CALS about … every two years and then in post-op we try to go over and run through a scenario with the ICU [intensive care unit] staff every six months, no longer than every six months, just to make sure that we capture new ICU people.' (Participant 6)
		'… and yeah, probably happens about three or four times a year …' (Participant 8)
		'Yeah, they're not … the education days are at least once a month … you know, that flows out into that simulation-type scenario, but they do every six months that the anaesthetists will come on board … and run some well.' (Participant 1)
		'… about once a year initially … we realised with once a year that people … the learning curve starts all over again. So we did do it once every quarter.' (Participant 5)
		'So I'll try and do ten a year … in my experience, it was only … it was ad hoc when the list is cancelled because the doctor was sick.' (Participant 7)
		'… we don't do very much because of the time factor, but we try at times to pull together teams or people to get what we can done.' (Participant 2)
		'However, in reality, it can be up to three months between running a good session …' (Participant 4)
	Participant opinion on the ideal frequency varied	'I think quarterly would be reasonable. I think every six months is probably … yeah, a little bit long between drinks, I guess you could say.' (Participant 1)
		'And just the outcomes were so much better once we started doing four times a year.' (Participant 5)
		'Look, I think … even with ALS, like by the time I come around to do my next ALS … certification, I have to sit down and read the book really carefully. So I think every six months would probably be better than every 12 months.' (Participant 6)
	Conducting regular simulation training was important	'… we realised with once a year that people … the learning curve starts all over again. So we did do it once every quarter … And we … saw so many good results out of it. People started to get … their heads around it. And they … they went into this this mode of, "okay, I know now I don't have to think too much".' (Participant 5)
		'Look, I think, … even with ALS, like by the time I come around to do my next ALS … certification, I have to sit down and read the book really carefully. So I think every six months would probably be better than every 12 months.' (Participant 6)
		'… by the end of the year, the majority of the anaesthetic nursing staff will have been able to run through things in a consistent way so that they behave consistently when it comes to managing a crisis.' (Participant 3)

Table 5 (continued): Frequency (Theme 3)

Subthemes	Key points	Participant narrative
Available facilities	Available facilities affected the frequency of simulation training and was dependent on operating lists	'… what does make it easier … they will allocate a day, like, or, as an example, an hour where we're not running theatres.' (Participant 1)
		'I'll say one thing, COVID last year was really great for a little while. We had time … especially we had a whole day surgery department empty. So we had room, so we can set it up and we could have sessions after sessions. You know, that was really good.' (Participant 2)
		'… and I'm lucky that I exist in a period when I have access to spaces, which are otherwise vacant, and staff [who] … are allowed to … have time to be involved. But I know it's a bit tenuous and I've gone through periods when we haven't had access or staff …' (Participant 3)
		'… we usually have a theatre that we pick; it's the theatre that's going to be for simulation training. And that's the whole point of not booking elective cases for that time. So it all kind of works out quite well.' (Participant 4)
		'And the next barrier was like finding a venue … because private is different.' (Participant 5)
	Clinical services took priority over training and education	'… we've still got to run a clinical service and training and everything's amazing, but … that's often the first thing that we have to pull back on.' (Participant 8)
		'And if things get a little bit tight … we get cut first. So if there's no physical theatre space … we won't be allowed to do it … if we increase our operating theatre capacity from seven to nine, my simulation disappeared.' (Participant 3)
	Lack of support from hospital administration and management impacted the ability to run simulation training	'The wise thing to do, we don't always tell management that we've booked a theatre to do something, but anyway that's what happens because we need to do it … so … the management and administration really … not part of it … they expect it to be done, but there's … yeah, it usually has to be within the compliance or time limits and budgets.' (Participant 2)
		'Yes, being prioritised is probably the most important one. So … how much the administration puts into deciding whether or not, … our simulations … are clinically prioritised.' (Participant 3)
		'I mean, definitely, starting at the top and having the managers of every area on board … and making that commitment. That's definitely the first thing.' (Participant 4)
		'The barriers were mainly higher management because I was middle management … the manager … she was like, "No, no, no, we're not. We're private. I'm not, you need to do this in your own time".' (Participant 5)
	Supportive management was an enabler of running simulation training	'… [the enablers were]: A, my determination … and B, the support of the nurse unit manager. So without her things would not have happened … even something like, you know, "Oh, am I allowed to use the $300 Caesar [Caesarean] pack for a SIM?"' (Participant 7)
	Scheduling simulation training could be an enabler of running simulation training	'… they've added a once a month, an education morning, which is mostly by the nursing staff. And that just gives us space all of a sudden.' (Participant 3)
		'… but we were lucky enough to have a late start once a month …' (Participant 7)
		'… the enabler is having that facility area … at times we've had, you know, marked little things on our calendar and say, don't book anything in that room.' (Participant 2)

Table 5 (continued): Frequency (Theme 3)

Subthemes	Key points	Participant narrative
Available facilities	Even when scheduled there is competition for physical space to conduct training	'And so it doesn't necessarily matter which theatre that we use we just pick one. It depends on … what other people have booked in for their training sessions and things at the same time.' (Participant 4)
	Running simulation training in the morning is not always ideal	'Currently they are in the mornings, and we find they are little more difficult to staff. If they're on in the afternoon … where you've got late staff coming on … there's a little bit more fat in the roster in the afternoons, so we're trying to get them switched over. But … the simulation room is also used by … ED [emergency department] teams and … perhaps ICU teams and things like that.' (Participant 8)
Staff availability	The availability of staff to attend simulation training was also opportunistic and ad hoc.	'… and then once we've sort of got that commitment … obviously, staffing, I think, for everyone is the biggest, biggest issue.' (Participant 4)
		'… so there's your first issue, which is, do we have somewhere we can do it. … staffing is the other one. And the answer is, "Yes, we've got a couple of spares, you can have them" or "No, sorry. We're tight today. No go". And the experiences are completely different depending on whether or not you do or don't have people with dedicated time.' (Participant 3)
		'… as you know is staffing, which … I think all health services are challenging [sic] with … at the moment, but … we do try to build them in … and sort of get people on rostered days off or using their PD [professional development] leave or something like that. But … unfortunately with lockdowns and COVID and people being in isolation and things like that, sometimes the staffing is particularly challenging … We have had to cancel a couple because … you know, we haven't had a major player like in an anaesthetist.' (Participant 8)
		'We probably haven't got the capacity to be going over to labs and having time off away.' (Participant 2)
		'I think time is a big problem. You know, getting enough people in the one place at the one time.' (Participant 6)
	Time needed to be prioritised to allow staff to attend simulation training	'So having protected time, which we have started to do … so once a month, we have a morning that it's emergency cases, only no elective cases are booked. And that time is, you know … dedicated to education and professional development.' (Participant 4)
		'… one of the barriers we, as theatre nurses, face is lack of protected time for education.' (Participant 7)

Table 6: Teamwork (Theme 4)

Subthemes	Key points	Participant narrative
	Simulation training strengthened the perioperative team and improved teamwork	'Yeah, I think it … it strengthens the team and … builds … positivity … confidence within your colleagues … Confidence and positivity, what I'd say.' (Participant 1)
		'Definitely. I definitely think there's an improvement in teamwork. And, as I said before, I think people get an appreciation for what pressures and stresses other members of the team are under. … that other people in the team are playing at the same time. Yeah. And I think you know it, also in simulations, a lot of times you make lot of certain situations. If something doesn't go as planned, everyone has a joke and then we do it again and do it the proper way. And I think that that's good for team building as well. And that you know everyone sees that everyone else is human.' (Participant 6)
		'It's better, it's so much better. And whether that's from perioperative team training or whether that's just some other non-technical skills that they're learning now, because we've realised that they need to be good at those things. Yeah, so I think having that non-pressured opportunity to get to know people a little bit better. It helps, like actually learning people's names and not just in a quick huddle around the room, "My names blah blah, I'm the orthopaedic reg" and you don't even hear what they've said their name is … doesn't help. So having that chance to get to know people a little bit more … we actually find things. Like morning teas afterwards in the debrief is sometimes maybe contributing to that too, because I think just the more people are friendly and know each other's names and stuff … the better that sort of thing gets in terms of socialising … and I guess that's the whole point … of team training is making everyone feel like they're an equal part of the team.' (Participant 4)
		'… the team was so cohesive and then they knew that they could trust one another.' (Participant 5)
		'I think it is not enhanced … [but is] more cohesive because they've actually done some learning and they understand, and it's actually interesting.' (Participant 2)
		'I think it improves the after hours, teamwork … during the day and electively, I think … everyone's sort of got their roles and you do a buzzer in and you can get 5000 people as you do all the time. Rent a crowd comes ICU comes the MET [medical emergency team] team … you know, but I think after hours, the teamwork really has to be there and there's not as much. But I think it really does … help to get to know the teams … and for particularly coming onto that … that out of hours scenario.' (Participant 8)
Multidisciplinary	Although simulation training was multidisciplinary, not all members of the perioperative team were present. Anaesthetists were heavily involved in simulation training.	'… our simulation is run by the anaesthetists, organised in conjunction with the clinical nurse educators. So it's anaesthetist driven. Certainly.' (Participant 4)
		'… an anaesthetist and anaesthetic registrar and anaesthetic tech or an anaesthetic nurse, the scrub–scout roles, a theatre tech role … and then usually someone also playing the role of … bringing in the crash cart.' (Participant 8)
		'… it was set up for nursing staff predominantly to learn … and theatre techs as well, but we'd also have orderlies and we had a really strong buy-in from the anaesthetic group.' (Participant 7)
		'So we thought if we do it with the whole departments at the same time, that's probably too much. But we started initially planning with anaesthetics, so just, you know, difficult airway management. And we wanted to maybe invite the PACU team and … start with difficult airway management, airway obstruction first.' (Participant 5)
		'With … probably six or seven nursing staff, one or two theatre support techs … up to four anaesthetist consultants and a couple of anaesthetic registrars, sort of rotating over the course of the da … and mostly what we've done is … ALS-type simulations.' (Participant 3)

Table 6 (continued): Teamwork (Theme 4)

Subthemes	Key points	Participant narrative
	Surgeon participation was variable.	'We didn't have a surgeon. I think there was someone playing a surgeon … or perhaps there's some junior … JMO [junior medical officer] or VMO [visiting medical officer], perhaps playing that role.' (Participant 8)
		'… and I usually will … was lucky enough to get a couple of surgeons to come in and muck around with us just to make it a bit more realistic for the nursing staff.' (Participant 7)
		'… some surgeons that will … stay back a bit and do something. Or there have been some times where we've had a new procedure and in those situations they've been excellent. So we've had the Mako … robotic joint replacement system, and that was excellent … as in the surgeons went away for workshops, they sent staff away. And then we did cold scenarios in the theatre with the whole team … it was driven by the surgeon because he wanted it to run smoothly, and it did.' (Participant 2)
		'Yeah as soon as they [surgeons] found out, they were, like, "Sign me up" … yeah, so initially we started off with anaesthetics. But … we had … an eight-theatre complex and private, and it was small enough for the team to all be quite involved with one another. There were quiet a handful, a big handful, of surgeons actually that were quite interested in it.' (Participant 5)
		'So when we decide to run a simulation, you know, often the intensivist will come and participate and the surgeons are awesome because, you know, they know that if this situation is happening, then the shit's hitting the, you know what.' (Participant 6)
	Even when multiple disciplines were involved in simulation training there still appeared to be a divide in the perioperative team.	'… we do sort of operate slightly different spheres … I think the things that are, like, the bits where we cross over in terms of the stuff we want to practise … often don't always come to us. Like you can end up both having a crisis simultaneously. Those are the things like massive transfusion … but then it sort of falls to one or the other – things are going well for us or things are going badly for them. And not usually at the same time. So an anaphylaxis, they're not a whole lot of use to us in an anaphylaxis … unless they're doing CPR [cardiopulmonary resuscitation] and we're not a whole lot of use to them in a difficult case … unless we're just keeping up with a blood transfusion.' (Participant 3)
		'You've got the anaesthetic team busy doing all that … replenishing of blood and that sort of thing. But we also have the other side, which is scrubbed scout too, who are busy as well … There is a split down there because of that reason.' (Participant 2)

Discussion

Education

Multidisciplinary simulation training enabled Australian perioperative teams to practise the skills and knowledge required to manage an emergency, most notably, events requiring basic and advanced life support. This is reflected by participants in a study by Sharpiro et al.[27] who recognised the need to practise their resuscitation skills during simulation training. This is supported by the current study's research participants, who identified that practising is necessary to consistently manage emergencies within the perioperative environment.

Furthermore, research participants reported improvements in confidence following simulation training. Increases in confidence are attributed to the ability to practise rare emergency events in a safe and controlled environment in which no harm can occur to patients. Increases in confidence were also expressed by research participants in studies conducted by Hinde et al.[35] and Weller et al.[29]

Novice and inexperienced perioperative staff were expected to participate in simulation training, particularly if they were about to undertake work outside of normal operating hours. Simulation training was used to train these novice and inexperienced perioperative staff in roles that would normally be undertaken by more senior staff. The expectation was that novice and inexperienced nurses could then fulfil those roles when senior staff were not available. This is contrary to findings by Sorensen et al.[36] in which participants preferred to undertake simulation training in their normal roles; furthermore, taking on other roles was detrimental to their learning.

The emergency scenarios predominantly used for training Australian perioperative teams were basic and advanced life support. However, the type of scenarios varied between perioperative units, as did the method for determining which emergency scenarios should be used. In some instances, predetermined lists created by educators were used, while other scenarios were based on staff requests.

This is not dissimilar to current trends in literature. Some scenarios were based on needs assessments, some on real cases and some were developed by a team of health care professionals representative of those undertaking simulation training.[27,28,37,38] Importantly, the scenarios used for simulation training needed to be relevant to the clinical setting and realistic to the members of multidisciplinary perioperative teams for effective learning to occur.[36,39]

A search for new developments in simulation training has led to the discovery of the International Nursing Association for Clinical Simulation and Learning standards, which provides guidance on the development of scenarios for simulation training.[40] Highlighted in the literature and the research findings, is the requirement for a needs analysis to be performed to identify individual learning needs and guide the development of a professional development plan for simulation training.[40]

The most commonly listed scenarios used during simulation training were basic life support and advanced life support. Although participants identified that practising these emergency events led to consistent management and increased confidence, it is likely that other factors could influence the use of certain scenarios. Competence in advanced life support is a requirement for health care practitioners as part of the *National Safety and Quality Health Service Standards*, Recognising and responding to acute deterioration.[41] Furthermore, *The New ACORN Standards*[42] outline the need for perioperative nurses to undertake professional development, which includes resuscitation procedures.

Anaesthetic emergencies were also focused on during simulation training. These, too, are influenced by guidelines, as reported by Participant 3 (see Table 2). ANZCA[43] have a professional development standard which guides the activities anaesthetists must complete. These include two emergency activities and the teaching of other health care professionals, which could explain why predominantly anaesthetists were involved in simulation training.

Safe space

Ensuring that simulation training occurred in a safe space was deemed to be of the utmost importance to participants. A safe space enabled participants to feel supported by their team members and facilitators, and able to make mistakes without judgement. Maintaining a safe space throughout simulation training, including during debriefing, increased team member engagement in scenarios and post-simulation discussions. If physical and psychological safety is not maintained during simulation training, participants will not engage in discussions or reflect on the simulation, and learning will be reduced.[44]

Maintaining a safe space during simulation training was also important to reduce barriers to participation such as fear and embarrassment. Participants could be reluctant to participate because they feared appearing incompetent in front of their colleagues. This is reflected in a study by Wakefield et al.[45] where participants expressed concern about how they would appear to colleagues. Reluctance to participate and potential fear of simulation training could also be associated with nervousness pre-simulation or previous negative experiences. Often fear was more prevalent at the beginning of simulation training; however, as team members participated in simulation training, their fear was allayed.

Another important point made by research participants is that simulation training should not be used in a punitive way. Simulation participants needed to feel good about the experience and themselves at the end of simulation training for simulation training to be an effective method of learning.

Facilitators were vital for the maintenance of a safe space during both the simulation training and debriefing. It was essential for facilitators to be supportive, non-judgmental and trustworthy. Furthermore, facilitators were

instrumental in setting the ground rules, including confidentiality, for the simulation sessions. This prevented mistakes that were made during simulation training being discussed outside of the training environment.[44,46]

Simulation facilitators needed to be formally trained as improperly trained facilitators can be harmful to the perioperative team members. Facilitators recognise formal training as being essential for their role as it enables them to provide standardised simulation training for multidisciplinary teams.[30,39] Despite the international standards providing guidance on the training of simulation facilitators[47] varying experiences and training of facilitators exists in perioperative units in Australia. Formal training should be undertaken and would enable facilitators to provide constructive feedback and maintain simulation training as a positive experience and a safe space.[48]

Another important function of facilitators was running debriefing after simulation. During debriefing, facilitators need to provide constructive feedback and encourage reflective thinking and discussion.[47] Often the debriefing session would be as long as, if not longer than, the simulation scenarios. The importance of post-simulation debriefing was also recognised by Wongsirimeteekul et al.,[22] Weller et al.,[28] Weller et al.[29] and Arriaba et al.[39] Paige et al.[49] also identify a structured debriefing process but did not place a timeframe on the debriefing sessions. Although post-simulation debriefing did occur within Australian perioperative units, research participants did not report structured debriefing.

As discussed previously, participants in the current study identified the importance of facilitators maintaining a safe learning environment during debriefing, particularly if mistakes had been made during the simulation, in order for perioperative team members to engage in discussions and learn from the scenarios. Likewise, Sorensen et al.[36] identified debriefing as essential for the transfer of learning to the clinical setting and that debriefing was a very positive part of simulation training. In addition to their importance to learning, debriefing sessions were also important to manage emotions and identify what went well during the simulation sessions. Furthermore, Wongsirimeteekul et al.[22] described debriefing as important for allowing participants to destress after the simulation. Participants in the current research also identified the potential for debriefing to highlight positive team interactions during simulation training.

Frequency

The frequency with which simulation training was held varied within some health care facilities and was often on an impromptu and opportunistic basis. Conversely, other health care facilities held simulation training on a regular basis, scheduled as part of a regular training and education program with sessions built into rosters. Regular simulation training can be facilitated by incorporating it into the organisational training.[28] Participants in the current research identified that regular simulation training could ensure all staff have access to simulation training. Furthermore, regular simulation training enabled the consolidation and retention of knowledge – if there was too large a gap between simulation training sessions, participants felt as though they had to relearn the skills and knowledge previously gained. A higher frequency of simulation training allows more perioperative team members to participate, increases experience in the management of emergency events and allows team members to become more familiar with the process of simulation training.[48,50]

The frequency with which simulation training could be held was influenced by both the availability of a physical space in which to conduct simulation training and the availability of staff to participate. The limited availability of physical space meant that simulation training was often ad hoc as access to an empty operating theatre relied on operating lists being cancelled. The limited availability of staff is reflected in the literature as recruiting staff to participate in simulation training can be difficult and is dependent on rostering.[14,22,30,50] Despite simulation training being scheduled to occur during normal education sessions, clinical services always maintained priority, and sessions could still be cancelled if a theatre or staff became unavailable.

An additional barrier to conducting simulation training could be the lack of support from hospital administration and management. Support from hospital administration and management is vital to facilitate availability of staff, facilities and equipment.[29,49] Staff, facilities and equipment can be costly; however, incentives for hospital administration and managers can be in the form of funding for simulation training from malpractice insurers.[28,39] Participants in the current research highlighted that a supportive manager is key to running simulation training as they provide access to a physical

space, staff and some equipment. Supportive managers enable the scheduling of simulation training and lead to fewer cancellations of simulation sessions.[29,46] Participants in the current research identified the need for protected time to be set aside and made available for simulation training. This was also recognised in a later study by Shi et al.[51] who found that during protected time, operating lists would not be run, therefore making a physical space and staff available to attend simulation training.

Teamwork

Multidisciplinary simulation training has been identified as an important education method for improving non-technical and technical skills for perioperative teams.[31] However, participants in the current research identified only one non-technical skill, teamwork, as having improved following simulation training. Participants reported that the perioperative team was strengthened following simulation training, and a more cohesive team was created. There was also an increase in team members' knowledge of each other's roles in an emergency and an appreciation for what those roles required. Similarly, Sorensen et al.[36] identified that team members gained an appreciation for the roles and tasks undertaken by their fellow team members, and Weller et al.[29] identified an increase in rapport across perioperative teams following simulation training. The confidence in each team member's ability also increased following simulation training.

Despite the improvement in teamwork, there still appeared to be a divide within the multidisciplinary team during simulation training. Anaesthetists were more involved in simulation training than surgeons, and even when the entire team participated, there still appeared to be a divide. The anaesthetic team and surgical team have vastly different tasks and requirements during an emergency, and these do not always appear to crossover. The surgical team focus on their tasks and, likewise, the anaesthetic team focus on theirs with very little crossover in the management of the simulated patient during an emergency.

Limitations

Participants recruited for this research study were from nursing and anaesthetic professions. More participants from other perioperative professions should be recruited in future studies to provide further data on the impact of multidisciplinary simulation training for Australian perioperative teams. Furthermore, a number of participants were perioperative educators and/or facilitators of simulation training. More participants who were not so closely associated with the facilitation of simulation training may present different findings and should be recruited in future research studies. A larger number of participants could be recruited to gain further data to guide clinical practice changes.

Implications and recommendations for clinical practice

Several recommendations for practice can be made from this research study's findings.

- Multidisciplinary simulation training should be routinely undertaken by Australian perioperative teams to develop consistency in the management of emergency events.
- When facilitating simulation training, facilitators must maintain a safe environment for effective learning to take place.
- Australian and international standards should be adapted for use within Australian perioperative units to guide the types of scenarios used for training and the training of simulation facilitators.
- Hospital administration and perioperative managers should support and prioritise simulation training and facilitate the availability of physical space and staff to undertake multidisciplinary simulation training.

Further research

Further research should be conducted to examine the effects on other non-technical skills following simulation training. These include communication, leadership, decision-making, task delegation, situational awareness and collaboration. Additionally, in the absence of Australian or international guidelines, further research should aim to determine the ideal frequency for multidisciplinary simulation training for Australian perioperative teams. Lastly, further research should explore the creation and maintenance of protected time to ensure Australian perioperative team members are able to attend multidisciplinary simulation training.

Conclusion

Multidisciplinary simulation training was widely used by Australian perioperative teams to practise the technical skills needed to consistently manage emergency situations. Basic life support and advanced life support were the most commonly used scenarios, but anaesthetic and surgical emergency scenarios were also used.

Facilitators running simulation training were vital for effective learning, and an essential task of facilitators was to create a safe space during simulation training. A safe space was conducive to effective learning as it allowed perioperative team members to fully engage in training and discussions without judgement or embarrassment. Furthermore, simulation facilitators needed to maintain a safe space during debriefing sessions which were also vital for effective learning following simulation training.

The frequency of simulation training was variable and dependent on the availability of staff and facilities, which was dependent on the support or lack thereof from hospital administration and perioperative managers. Further research should be conducted to ascertain the ideal frequency of simulation training and to examine protected time for perioperative team training. Further research should also be conducted to determine the effects of simulation training on non-technical skills within perioperative teams.

Multidisciplinary simulation training is a practical training technique and should be routinely undertaken by Australian perioperative teams to develop consistency in managing emergency events within the perioperative setting.

Conflict of interest

The researchers have no conflicts of interest to declare.

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