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Authors

Dr Jutharat Attawet
Swinburne University of Technology

Dr Penny Sweeting
Charles Darwin University

Elaine Correia Moll
University of Technology Sydney

Dr Kim M Caudwell
Charles Darwin University

Corresponding author

Dr Jutharat Attawet
Swinburne University of Technology
jattawet@swin.edu.au

Operating theatre nurses' experiences in medical emergency response: An integrative literature review

Abstract

Aims: This study aims to review the experiences of instrument and circulating nurses in responding to intra-operative medical emergencies.

Background: The operating theatre is a complex environment where surgical procedures are performed by surgical teams who are often required to adapt to rapidly changing circumstances. Although most surgeries are uneventful, medical emergencies can occur. Instrument and circulating nurses play pivotal roles in patient safety during the intra-operative phase. However, research into their experiences dealing with medical emergencies is limited, highlighting the need for a better understanding of their perspectives and identifying areas where additional training and support may be required.

Design: An integrative review.

Methods: We conducted an electronic literature search in Medline, CINAHL, Scopus, Science Direct and PubMed databases. Three reviewers independently screened, extracted data and assessed quality, using Joanna Briggs Institute software to facilitate the process. We followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines for reporting.

Results: Three studies were included, but they did not explicitly address instrument and circulating nurses' experiences during intra-operative medical emergencies. Instead, they discussed these nurses' involvement in such emergencies, emphasising their mental preparation and the importance of effective communication and coordination within the team. The overall team's experience influenced how medical emergencies were managed.

Conclusions: The experiences of instrument and circulating nurses during intraoperative medical emergencies remain underexplored in the literature. While some research examines surgical adverse events, there is a gap in assessing these nurses' confidence and competence in such events. Non-technical skills are crucial, but the interplay with technical skills remains unexplored.

Keywords: emergency, medical emergency, instrument nurse, circulating nurse, perioperative nurse, operating theatre

Introduction

The operating theatre (OT) is a complex environment where surgical procedures are performed, and teams must be dynamic in response to challenging and often fast-changing situations[1]. For the most part, surgical procedures are performed without incident, but medical emergencies requiring resuscitation and sometimes intra-operative cardiopulmonary resuscitation (CPR) do occur[2]. These events can occur at any point throughout a patient's perioperative journey.

There are three distinct stages of the perioperative journey – pre-operative, intra-operative and post-operative[3]. Perioperative nurses, which include anaesthetic nurses, instrument nurses, circulating nurses and Post Anaesthesia Care Unit (PACU) nurses, play a vital role in each stage and have different roles and responsibilities[4]. During the intra-operative phase or surgical intervention, instrument and circulating

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nurses are responsible for the surgical fields and assisting the surgeon while collaborating with other team members to achieve optimal patient care[4]. These nurses typically anticipate care with the surgical team, supply instruments, check accountable items and consistently monitor the intra-operative environment and the aseptic status of the sterile team using their 'surgical conscience'[3].

Also during the intra-operative stage, circulating and instrument nurses play a crucial role in maintaining patient safety and responding to medical emergencies[5,6]. In their qualitative study of perioperative nurses in the United Kingdom (UK), McGarry et al.[5] found that maintaining patient safety was a high priority for perioperative nurses. In their quality improvement study, Caruso et al.[6] highlighted that while the roles and responsibilities of code blue responders were unclear in the OT, the constant availability of the instrument and/or circulating nurse and OT nurse positions in the OT made them an integral part of the medical emergency response team.

Circulating and instrument nurses therefore employ a combination of technical and non-technical skills, including communication, preparing emergency equipment, managing the sterile field and situational awareness, to help manage a medical emergency[7]. Specific tasks assigned to instrument and circulating nurses during a medical emergency included activating the emergency response, performing chest compressions, assisting with peripheral lines and documentation[6].

Despite the dearth of research into the roles and responsibilities of OT nurses, and imprecise definitions and nomenclature[5], it is evident that these nurses are integral to managing medical emergencies in the OT which requires a combination of specific technical and non-technical skills. For instance, at a minimum, technical skills would include basic life support skills and knowledge of emergency protocols. However, while instrument and circulating nurses may indeed possess these skills, their primary role is the maintenance of a sterile field and providing support for the surgical team[3]. Because other nurses, such as recovery and anaesthetic nurses[4], may play a more visible role in managing medical emergencies there may be a perception that instrument and circulating nurses do not have responsibility in the context of a medical emergency. Indeed, most of the literature focuses on instrument and circulating nurses' roles during surgery and their non-technical skills during adverse events, and research examining instrument and circulating nurses' experiences managing medical emergencies is limited. Consequently, instrument and circulating nurses may not receive adequate support and training for their roles and responsibilities during medical emergencies.

To address this gap, we reviewed the literature to understand the experiences of instrument and circulating nurses in intra-operative medical emergencies and to identify areas where further training and support may be needed.

Methods

A five-stage integrative literature review approach was adopted in this study, incorporating problem identification, literature search, data evaluation, data analysis and presentation[8]. This approach has been used extensively to enhance the rigour of the review process in nursing and features in similar integrative reviews[9].

Literature search

An extensive literature search was conducted in June 2024. The databases searched included Medline (EBSCO, CINAHL (EBSCO), Scopus, Science Direct and PubMed. We also manually searched Google Scholar and the reference lists of relevant articles. The search included qualitative and quantitative primary and secondary studies published in English between the years 2013 and 2024. The identified keywords were 'perioperative nurses', 'theatre nurses', 'scrub', 'scout', 'instrument nurses', 'circulating nurses', 'emergency', 'medical emergency', 'code blue', 'rapid response', 'deterioration', 'perioperative', 'operating theatre' and 'operating room'. Key terms were also searched using Medical Subject Headings (MeSH) terms. During the search process, consideration was given to the diverse terminology used, synonyms and the spelling of keywords.

Inclusion and exclusion criteria

This review included studies focused on the medical emergency experiences of perioperative nurses, particularly instrument and circulating nurses. Any studies that solely investigated medical emergency experiences of anaesthetic nurses, PACU nurses, surgeons and other healthcare workers were excluded. Any studies that included medical emergencies in other departments, apart from the OT, were excluded. (see the decision tree in Supplement 1).

Data screening and extraction

Joanna Briggs Institute (JBI) software (JBI Sumri) was used for study selection and extraction. The initial search identified 1351 titles from databases. Another four articles from references and citations that were seemingly relevant were retrieved and assessed for inclusion. We excluded duplicated (n = 104) entries, leaving 1251 titles. The title, abstract and whole text were assessed against the inclusion and exclusion decision tree (see Supplement 1). The titles, abstracts and full texts of articles were independently screened for potential eligibility by the first and second authors. Disagreements were solved by discussion. A third author was available to reach a majority if a consensus could not be reached. A total of 1248 articles were reasonably removed, with three articles remaining. Figure 1 presents the search procedure and outcomes.

Data were extracted from each included study independently by the third author, generating a summary table that captured author, year published, study design, method, sampling approach, subjects' country of origin and key findings. The data extraction process was reviewed and checked by the first and second authors for consistency. Any discrepancies were discussed until consensus was reached. Once complete, a summary table of the findings was generated (see Supplement 2).

Data evaluation

The three articles were appraised for quality using the JBI assessment and review instruments[10]. The first and second authors performed the article appraisal independently. Any disagreements were discussed and resolved. Supplement 3 details the evaluation of these articles.

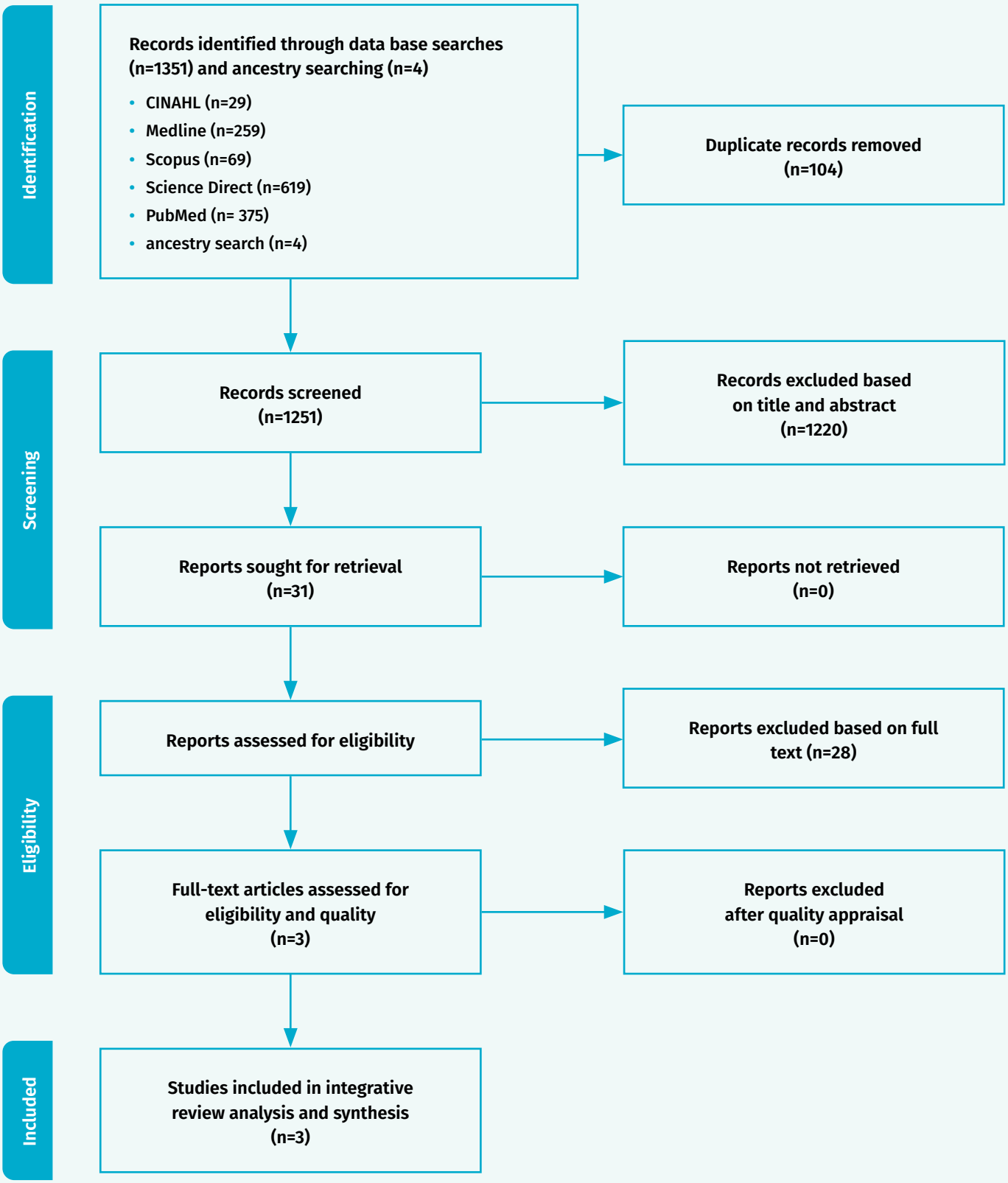

Figure 1: PRISMA flow diagram of search procedure and outcomes

Due to the low number of articles that met the inclusion criteria, it was decided to include all three articles in the review.

Data analysis

Data analysis was facilitated by Nvivo 12. The results of the experiences of instrument and circulating nurses in managing or responding to medical emergencies were analysed using thematic analysis[11]. Data were analysed individually by the first, second and third authors, and then triangulated. Data were coded and categorised into groups and themes to answer the research question. All authors reviewed the themes and discussed if there were any ambiguities. All authors resolved any disagreements of data analysis through discussion and consensus.

Researchers referred to the primary source, as needed, to verify context and help clarify the subthemes. A master list was generated, and the researchers determined the final placement of each subtheme into a theme. The researchers then synthesised each theme's essential elements and conclusions into an integrated summation. Themes and sub-themes were generated from the findings that reflected the review's aims.

Results

The three reviewed studies were conducted in China, the UK and Sweden. There was a total of 377 OT nurses – 361 in China, 12 in the UK and four in Sweden. The studies from the UK and Sweden identified OT nurses as instrument and circulating nurses, while the study from China did not specify the nurses' roles. The terms used for OT nurses in this reviewed study refer to instrument and circulating nurses.

Three themes emerged from data analysis – management in medical emergency, support, and impact on individuals. Sub-themes were also identified under each theme (see Table 1).

Table 1: Themes and subthemes identified from data analysis

Themes	Subthemes
1. Management in a medical emergency	• Medical emergency events • Communication and coordination • Preparation and planning • Problem-solving and adapting
2. Support	• Team • Staff experience
3. Impact on individuals	• Impact • Learning/gaining

Theme 1: Management in a medical emergency

Medical emergency events

A medical emergency is a sudden and unexpected medical situation that requires immediate attention and intervention to prevent serious harm, disability or death. In the OT setting, medical emergencies such as cardiac arrest are rare but sometimes catastrophic if not managed correctly[12]. In one study, over half of the medical events in the OT were related to surgical incidents, such as wrong-site surgery and retained foreign objects, rather than medical emergencies[13]. Interestingly, this study also extended the term surgical incident to include a patient's death in theatre[13].

In this review, instrument and circulating nurses experienced medical emergency events during the intra-operative period, including critical situations, such as sudden changes in patient conditions and sudden patient death, and unexpected issues such as equipment-related problems. Although the literature claims that medical emergency is rare, the study by Wang and colleagues[14] reported that 33.5 per cent of instrument and circulating nurses experienced a patient's sudden death from changing conditions on the operating table.

Communication and coordination

In managing the medical emergency, instrument and circulating nurses believed communication was a well-functioning system to create safe care[1]. Instrument and circulating nurses often communicated with the team to gain support and prioritise their tasks. Receiving the same information drove effective team functioning.

Communication and coordination were identified as critical for managing challenging situations. Instrument and circulating nurses described being familiar with the team and coordinating effectively as providing security. Staff found communication more difficult in larger teams and teams not well socialised. Instrument and circulating nurses perceived communication to be more critical in these situations to promote coordination of care. In less integrated or larger teams, there is potential that things are 'missed' where there is a lack of effective communication[1]. Communication and coordination were important both within the OT and with outside personnel and departments. Staff identified the importance of communicating with outside departments to access resources, personnel, equipment and emergency support[1].

Communication also impacted instrument and circulating nurses after the medical emergency. A lack of communication was believed to contribute to the ongoing adverse effects of a surgical incident. Instrument and circulating nurses described that a lack of communication after the event lead to increased stress and fear for future job prospects[13]. Instrument and circulating nurses also described feelings of suspicion towards other OT personnel when there was a communication vacuum, believing that instrument nurses were unnecessarily blamed for adverse events in the OT[13].

Preparation and planning

Self-preparation is used by instrument and circulating nurses before surgical procedures to prevent medical emergencies and adverse events. Self-preparation appeared to also be used as a mental preparation technique for the surgery. Instrument and circulating nurses self-prepared and shared the plan among the surgical team based on the

patient's need and the type of surgery to create 'a mental model'[1]. Instrument and circulating nurses described that the mental model always had multiple plans for unexpected events to give peace of mind and create safe care.

The instrument and circulating nurses' preparation also required them to consider not only patient factors but also the needs and experience of the surgeon and surgical team. Instrument and circulating nurses prepared to be more vigilant during procedures with unfamiliar teams or junior OT personnel. Planning and prioritisation were based on the expected course of the surgical procedure, anticipated potential complications and subsequent management strategies. Instrument and circulating nurses appear to recognise the importance of preparing to maximise safe patient care in the OT[1].

Problem-solving and adapting

Instrument and circulating nurses used policies, procedures and standardised tools, such as surgical checklists, guidelines and index cards, to help them prepare for surgical procedures and adapt to adverse events. Adhering to procedures and guidelines helped to reduce interruptions and disruptions; however, when unexpected events occurred, instrument and circulating nurses identified that priorities would need to change and practices adapted to the situation. For example, instrument and circulating nurses prioritised lifesaving interventions over ensuring sterility[1]. Instrument and circulating nurses use their problem-solving skills by assessing the risks against the benefits and adapting to the situation. The mental model created before the surgical procedure was adapted and followed to solve or manage medical emergencies[1].

Theme 2: Support

Team

Resources are essential to support instrument and circulating nurses in managing medical emergencies. Support from their team is perceived as a resource nurses draw on for the provision of safe care. Instrument and circulating nurses coordinate with their team to prepare and share the plan in order to prevent unexpected issues. Team support appears especially relevant when instrument and circulating nurses raise concerns about a change in a patient's condition, and familiarity with the team provides a sense of security in a medical emergency.

Understanding each team member's role and responsibility in and outside the OT helps instrument and circulating nurses to manage changing situations. Knowing each member's responsibilities and strengths meant they could be called upon to help with specific critical events in the OT[1]. While instrument and circulating nurses sought help from team members within the OT, they also leveraged team members outside the OT to seek support and access additional resources[1].

Staff experience

The experience of instrument and circulating nurses impacted the perceived ability of the team to respond to emergencies. Instrument and circulating nurses described that nurses with more experience had better situational awareness and anticipation of what would happen, and a more holistic view of the surgical process[1]. Instrument and circulating nurses identified that experience helped them speak up when problems were identified, make decisions and follow a plan of action. If other team members in the OT were less experienced, this was described as an increased need for critical thinking responsibilities of the instrument and circulating nurses[1].

Theme 3: Impact on individuals

Impact

Instrument and circulating nurses reported that medical emergency events had personal and professional impacts. These included burnout, emotional exhaustion, depersonalisation and low personal accomplishment[13,14]. Serou et al.[13] reported that the short-term impact included loss of confidence, depression, sickness and worrying about career progression. Long-term impacts involved losing trust and confidence in other health professionals, becoming overly cautious and contributing to confusion and miscommunication within the team.

A patient's sudden death in the OT was found to be the most distressing event for instrument and circulating nurses, and often impacted on their mental and physical wellbeing in the short and long term[14].

Learning/gaining

Instrument and circulating nurses reported they gained experience from medical emergency events and reflected on their practice. Incidents in the OT sometimes positively impacted instrument and circulating nurses, contributing to professional and personal growth. One nurse described learning to be more attentive and cautious and developing a better sense of role expectations[13]. Learning from intra-operative adverse events was facilitated by reflection and group discussion with other team members[1].

Discussion

In this review, we sought to understand the experiences of instrument and circulating nurses in managing or responding to medical emergencies in the OT. While our search revealed abundant literature on their role in managing adverse events, we could not find any research explicitly addressing our research aim. The three studies included in the review, however, did contain elements related to the experience of instrument and circulating nurses during medical emergencies, adding that they often mentally prepared themselves, creating a 'mental model' to prevent unexpected and adverse events before and during surgical procedures. The planning and sharing of information with the surgical team appears vital to their preparations.

The mental model concept has been simplified from cognitive processes to help humans recognise the environment around them to reduce uncertainty[15]. In health care, the mental model concept was further developed and introduced as a 'shared mental model' in the mid-2000s for teamwork training[16]. The shared mental model has been successfully used as a coordinating mechanism that facilitates good teamwork behaviour[17]. Although the context of teamwork and collaboration has been frequently discussed in health care, the 'shared mental model' concept is not commonly mentioned[17]. Our study has indicated that surgical teams use shared mental models to help prepare for surgical adverse

events and emergencies. Instrument and circulating nurses created a mental model that was then shared with other members of the surgical team prior to surgery. Sharing of the mental model helped with team collaboration and guided problem-solving when facing medical emergency or intra-operative incidents.

Communication was highlighted in the studies as necessary for preventing and preparing for emergencies and incidents. Indeed, communication is a recognised skill for the mental model development process. The theory of relational coordination recognises that communication plays a crucial role in coordinating tasks, which has been observed to enhance the quality of treatment and ensure the safety of patients[18]. The importance of communication in emergencies is also highlighted by the Australian and New Zealand Resuscitation Council (ANZCOR) Guidelines that provide guidance for healthcare professionals faced with scenarios that require emergent care[19].

Our review found that instrument and circulating nurses demonstrated proactive and intuitive communication by collaboratively sharing plans and objectives with the broader surgical team. They emphasised the importance of addressing emergent issues prior to and during the surgery list. Theoretically, this type of relational coordination is characterised by teams working on shared goals, problem-solving without blame and working with mutual respect for everyone's skills and contributions[20]. These types of collaboration and communication patterns have been identified in a team performing a lengthy surgical procedure or involving a high degree of complexity[20].

In contrast, our review found that proactive and intuitive communication has been implemented by instrument and circulating nurses for self-preparation to create the shared mental model regardless of the complexities of surgical procedures. Although this indicates that instrument and circulating nurses are often proactive and strategic in their response to preparing for and managing medical emergencies, one study found that instrument and circulating nurses sometimes felt blamed when an intra-operative incident occurred[21]. This study, conducted in Australia showed that the experience of being blamed can lead to feelings of incompetence , which could reduce confidence[21]. However, our study could not identify instrument and circulating nurses' skill competency or confidence in managing or responding to medical emergencies due to limited evidence.

Even though our findings underscore the importance of communication within relational coordination, none of the studies explored the experiences of instrument and circulating nurses during medical emergencies. The exploration of not only non-technical skills, like communication and coordination, but also the technical skills exhibited during medical emergencies remains largely unexplored among this group. Although there have been studies showing that in situ simulation training can improve technical skills and increase the confidence of individuals and teams in managing medical emergencies[21], further exploration of the actual experience of instrument and circulating nurses is needed to understand their insight and customise their education and training.

Strengths and limitations

One of the strengths of this study was the adoption of an integrative review methodology to develop a more holistic understanding of the phenomenon of interest. We included all types of research designs in our search strategy to ensure a comprehensive and reliable approach[23]. Furthermore, a robust process was undertaken for each step in the project, and a comprehensive search strategy was employed to identify relevant literature. Another strength of this study was using researchers in different project stages. The independent search, screening and analysis of articles by multiple authors ensured the reliability and robustness of the process.

While this project has several strengths, the limitations need to be noted. Firstly, although there was a large number of studies in the perioperative nursing field, there was a limited number of investigations into instrument and circulating nurses' experiences in medical emergencies, and this affected the number of included studies for analysis. Consequently, our results may be limited in explaining instrument and circulating nurses' experience during medical emergencies. However, ultimately, the study provides evidence of a gap in our understanding of this phenomenon that needs to be addressed.

Implications for nursing practice

The experiences of instrument and circulating nurses during medical emergencies in the OT represent a critical yet understudied aspect of perioperative care. While existing literature has delved into surgical adverse events more broadly, it notably lacks a focused exploration of the confidence and competence of these essential nursing roles. This gap underscores the necessity for a well-rounded understanding within the literature, especially as these nurses are pivotal in managing complex and high-stakes situations that require both technical and non-technical skills.

Recognising the unique challenges these nurses face during medical emergencies, there is a clear need for comprehensive training and educational programs specifically tailored to enhance their skills and confidence. These programs should not only refresh foundational skills but also deepen their expertise in emergency response techniques, addressing the direct demands of the intra-operative environment.

To effectively prepare these nurses for the unpredictable nature of surgical emergencies, educational programs must incorporate advanced simulations. These simulations should mirror the high-pressure scenarios they might encounter, complete with unexpected medical complications that require quick, informed decision-making. Such immersive training is crucial for developing keen situational awareness, enabling nurses to navigate the fast-paced OT environment effectively.

The training must also emphasise the development of both technical skills, such as advanced life support (ALS) and precise management of surgical equipment during crises, and non-technical skills including communication, leadership and teamwork. These competencies are essential for ensuring effective coordination with surgeons, anaesthetists

and other OT staff during emergencies, thus enhancing the overall team response and patient safety.

Moreover, it is important to establish ongoing education programs to keep nurses abreast of the latest medical procedures, technologies and safety protocols. Regular workshops and refresher courses are vital for maintaining high competency levels and bolstering nurses' confidence in their abilities to manage any situation that arises.

Creating a supportive learning environment is equally important. Training programs should foster an atmosphere where nurses feel encouraged to discuss past experiences, share challenges and explore successful strategies for managing medical emergencies. Promoting a culture of continuous learning and open communication will not only boost the confidence of these nurses but also enhance their competence in managing intra-operative emergencies.

This paper advocates for future research to further investigate the experiences of perioperative nurses, who are crucial members of the surgical team, especially in scenarios such as intra-operative cardiac arrest. Such research is likely to shed light on potential improvements in education and training program gaps, supporting the development of both technical and non-technical skills that are critical for the effective management of intra-operative emergencies. This focused inquiry will enhance our understanding and support the advancement of nursing practices in the OT, ultimately leading to better patient outcomes and more empowered nursing professionals.

Conclusion

This review highlights the pivotal role of instrument and circulating nurses in managing intra-operative medical emergencies, emphasising their unique contributions and the challenges they face. Despite their critical involvement, there is a notable gap in research specifically addressing their experiences and the interplay of their technical and non-technical skills during such events. The findings underscore the need for targeted training programs that enhance both skill sets, incorporating advanced simulations and continuous education to improve preparedness and confidence.

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Declaration of generative AI and AI-assisted technologies in the writing process

The research team declares there was no artificial intelligence nor AI assisted technology used during any point of this study.

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