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Enhancing Emergency Registrar Education via Specialist Insights on Crisis Resource Management: A Phenomenological Study.

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List of figures and abbreviations

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Abbreviations

ACEM – Australasian College of Emergency Medicine

FACEM – Fellowship of the Australasian College of Emergency Medicine

ED – Emergency Department

CRM – Crisis Resource Management

SBE – Simulation Based Education

ZPD – Zone of Proximal Development

WBA – Workplace Based Assessment

EP – Emergency Physician

Abstract

Keywords

Emergency, crisis resource management, medical education, resuscitation, simulation-based education, burnout

Introduction - The team leader role in resuscitation is central to the practice of emergency medicine and is a key skill that must be taught to emergency registrars. There is an increasing focus on the value of simulation-based education (SBE) and its ability to teach doctors the key non-technical skills involved in team leading a resuscitation. This study seeks to gain knowledge and insights from practicing emergency physicians (EP) on how they use crisis resource management principles in resuscitation and how these insights can improve the educational experience of registrars training to be emergency specialists.

Methods - This is a phenomenological study using semi-structured interviews. 13 Fellows of the Australasian College of Emergency Medicine (FACEM's) based in Queensland and Tasmania were interviewed, and the interview data underwent thematic analysis.

Results - Seven emergency medicine specific applications of CRM were discovered and five overarching themes emerged; Shared mental model, positioning in the room, task delegation, positive team interaction and closed-loop communication.

Discussion/Conclusion - These results have been used to develop a pre-briefing discussion points list and a post-simulation debriefing tool to be utilised as part of curriculum for Simulation Based Education (SBE) for non-technical skills for emergency registrars. Participants also emphasised the importance of developing their own leadership style and the value of emotional intelligence and reflective practice for emergency medicine physicians.

Introduction

I am an Australian emergency physician and a medical educator. My career aspirations include the continuing improvement of emergency registrar education, to ensure that the next generation of emergency physicians (EP's) can perform effectively within the scope of practice of emergency medicine. Central to the scope of practice in emergency medicine is resuscitation of the unwell patient (Wilcox & Winters, 2020), regardless of whether they are unwell due to a traumatic event, an acute cardiac syndrome, sepsis or an obstetric emergency. The emergency physician is the team leader in this situation, the orchestrator of a successful resuscitation. Leading a successful resuscitation involves crisis resource management (CRM), the key principles of which are; know your environment, anticipate, share and review the plan, ensure leadership and role clarity, communicate effectively, call for help early, allocate attention wisely (avoid fixation), distribute the workload and monitor and support team members (Carne, Kennedy, & Gray, 2012). In more recent times it has been shown that these non-technical skills can be effectively taught via Simulation Based Education (SBE) (Zhang, 2023). It has also been demonstrated that SBE can be effectively integrated into a postgraduate education program (Takayesu, Nadel, Bhatia, & Walls, 2010) and can be used as an educational tool (Sherbino, Bandiera, & Frank, 2008).

So, with this awareness regarding CRM and SBE, the aim of my research was to use a phenomenological methodological approach to explore the lived experiences of emergency physicians in a team leader role in the resuscitation of an unwell patient in a clinical setting. Through this exploration I planned to uncover knowledge about their experiences and their use of CRM principles during resuscitation. With that information, I planned to use the educational theory of Vygotsky's Zone of Proximal Development (ZPD) as it relates to the education of emergency registrars, to inform the future education of emergency registrars in SBE programs so that facilitators are equipped with insights regarding what experts in the field deem to be

important skills and attitudes that they should be teaching to their junior colleagues. Gaining insight from EP's about both their non-technical and interpersonal skills may be a way to address educational shortcomings regarding the resuscitation team-leader role, whilst also providing an educational opportunity to combat burnout by gaining awareness about how they approach the inevitable emotional processing that occurs after a resuscitation.

The goal of this dissertation was to enhance emergency registrar education and thus it was important to know who the emergency registrar was and to understand how they are trained to become EP's. In Australian medical training, emergency physicians (commonly referred to as emergency consultants) begin as medical students (either undergraduate or postgraduate degrees), typically spend 2-3 years as a resident medical officer (however there is no time limit at this stage of training), spend 4 years as an emergency registrar and emerge as emergency physician/specialist after completing a series of assessments and exams. Emergency registrars are at a point in their careers where they possess a solid foundation in a wide range of medical knowledge acquired during medical school and core rotations as resident medical officers. Subsequently, they undergo four years of specialized training to develop the procedural and clinical skills required to become experts in emergency medicine. They bring a diverse range of backgrounds and experiences at the start of their training, but all have the same goal of becoming emergency specialists. Emergency registrars follow the Fellowship of the Australasian College of Emergency Medicine (FACEM) curriculum, which is based on the CanMEDS model and divided into 8 domains as illustrated below in Figure 1 (ACEM, 2023).

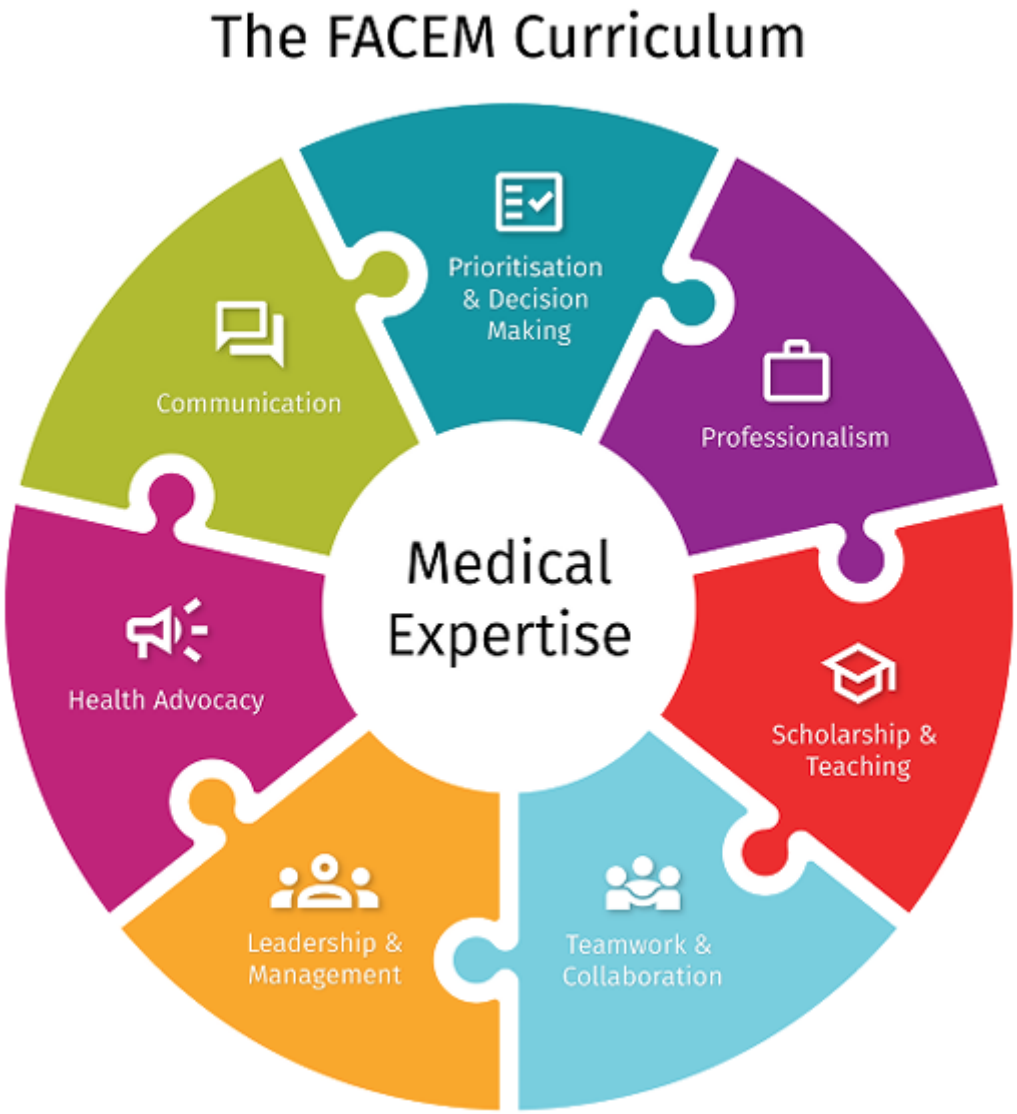

Figure 1. The FACEM Curriculum domains (ACEM, 2023, p. 6)

Within the domain of medical expertise, ACEM has created a scaffold (Figure 2) to demonstrate the important aspects of medical expertise required to be an Emergency Specialist and Resuscitation medicine is listed as one of the core principles of practice in emergency medicine.

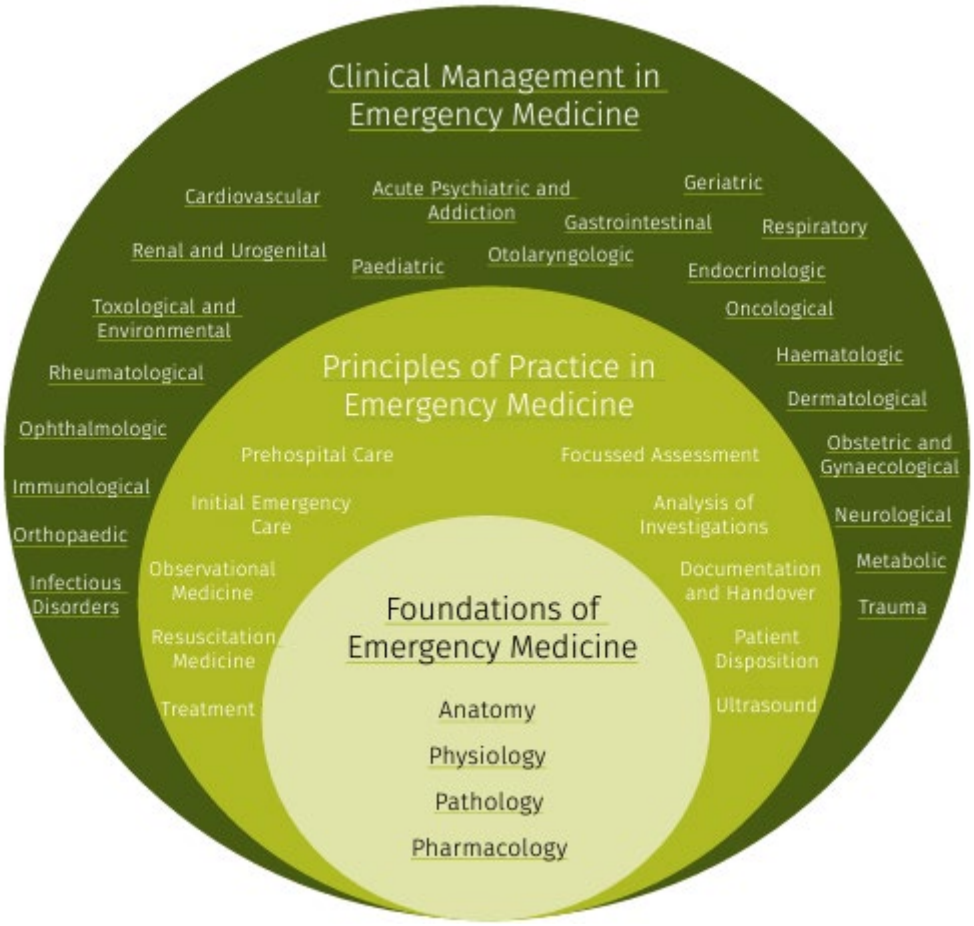

Figure 2. Scaffold of Medical Expertise for Emergency Medicine Physicians (ACEM, 2023, p. 21)

The expected outcomes when following the FACEM curriculum are illustrated with Figure 3 regarding teamwork and collaboration throughout their training.

Domain	Training Stage 1	Training Stage 2	Training Stage 3	Graduate Outcomes
Teamwork & Collaboration	Participate as an effective team member to treat all emergency patients. Co-ordinate an initial resuscitation team until a senior clinician's arrival. Collaborate with patients, families/whānau and caregivers, and other health professionals to enact patient management plans.	Undertake an increasing number of appropriately designated roles, acting as a team leader in simple clinical scenarios, and under supervision in complex clinical scenarios. Collaborate across interprofessional teams to provide effective patient care.	Confidently adapt to any team member role as directed to treat any emergency patient. Function as an effective team leader in most clinical scenarios, and collaborate with patients, families/whānau and caregivers, and other health professionals on issues beyond the immediate clinical scenario.	Effectively manage and participate in an interprofessional team, particularly at times of high stress and medical emergency.

Figure 3. Outcomes of the FACEM Curriculum (ACEM, 2023, p. 7)

Emergency registrars are expected to finish their training with the ability to effectively manage a team at times of high stress and medical emergency (ACEM, 2023). They are assessed via a series of Workplace Based Assessments (WBA's), one of which is entitled "Team Lead

Resuscitation" and involves direct observation of a registrar leading a team during resuscitation (ACEM, 2023). Both the education and assessment of emergency registrars involves the ability to lead a team during a resuscitation, thus applicable and generalisable knowledge from EPs was likely to enhance their training experience and increase their ability to successfully navigate the assessments required to become an emergency specialist.

Literature Review

I undertook a review of the literature to answer the following key literature review questions.

1. What is already known about crisis resource management and its applications in resuscitation?
2. What is being done currently to teach emergency registrars about leadership in emergency medicine?
3. What is the current evidence for simulation-based education as a tool for learning in emergency medicine?
4. What is a successful resuscitation?
5. How does the outcome of resuscitation impact emotionally on registrars during training?
6. What educational theory could be activated to enhance registrar effectiveness in the team leader role?

Crisis Resource management

The clinical concept that was utilised as framework for this dissertation and added a practical element, was the concept of crisis resource management. As alluded to earlier, crisis resource management is a collection of non-technical skills necessary for effective teamwork (Carne et al., 2012). It was developed initially in the aviation industry (Gaba, Howard, Fish, Smith, & Sowb, 2001) and has since gained prominence in the medical education community. Proficiency with these non-technical skills is critical for safe care of complex and acutely unwell patients (Higham

& Baxendale, 2017), which are a group of patients requiring resuscitation that is often conducted in emergency departments and led by EP's.

Carne et al. (2012) explored the concept of crisis resource management in the emergency department (ED) in greater detail. They outlined the seven key principles, know your environment, anticipate, share and review the plan, ensure leadership and role clarity, communicate effectively, call for help early, allocate attention wisely (avoid fixation), distribute the workload and monitor and support team members, providing a framework for the use of CRM principles to contribute to effective teamwork and the smooth running of an ED. Using this article as the basis of my literature review of CRM, I explored all seven principles in greater detail to highlight the importance of each and to add greater meaning and emphasis to the responses to the CRM based interviews that followed.

The first principle to explore was that of knowing your environment. Carne et al. (2012) surmised in their article that knowledge of both the physical and cultural environment was important and was linked to enhanced performance during resuscitation (Carne et al., 2012). EP's need to be aware of the location as well as the function of any emergency equipment needed for urgent interventions, to avoid delays for time critical procedures (Carne et al., 2012). Regular training to familiarise (or re-familiarise) clinicians with the location of these items is important for patient safety (Carne et al., 2012). It is not only the equipment, but also the human resources that are key to patient safety. Awareness of the roles that your team members are able to play, the clinical skills they possess, their background and their confidence level with each individual task ensures that later steps in CRM (particularly workload distribution) will be done in a way that is efficient and leads to the best possible outcome for the patient (Carne et al., 2012). On a deeper and sometimes more complex level, understanding of the cultural environment that you are working within was also crucial (Krimsky, Mroz, McIlwaine, Surgenor, Christian, Corwin, Houston, Robison, & Malayaman, 2009). Factors like a high power difference,

a mix of different cultures in one environment and the creation of social distance if team members feel as though they cannot participate are all things that can lead to a poorly functioning team (Carne et al., 2012). Prior knowledge of these factors can allow team members to take specific actions to reduce power differentials and ensure inclusiveness in their team environment (Perman, 2019). Knowing your environment is a key first step for a team leader to give them the best chance of a successful resuscitation.

Moving on to an exploration of the second principle, anticipation and planning, Carne et al. (2012) divided the anticipatory stage into both self and environment, identifying that separate attention must be paid to both elements in an emergency medicine context. Regarding the self, Carne et al. (2012) identified that a cognizance of self-factors such as HALTS factors (Hungry, angry, late, tired or stressed) and anticipatory measures to mediate those negative effects, can lead to a more efficient and potentially more successful resuscitation. Regarding the environment, anticipation of environmental factors can be achieved in many ways including the use of checklists which can improve one's ability to perform a series of necessary tasks (Keroack, Youngberg, Cerese, Krsek, Prellwitz, & Trevelyan, 2007). When addressing planning as a third separate aspect in the Carne et al. (2012) paper, the concept of shared mental models and how common goals can lead to effective teamwork (Salas, Cooke, & Rosen, 2008) was discussed and it was pointed out that when utilised effectively, this method can detect errors, preventing poorer outcomes and patient harm. Thus, when utilised effectively, anticipation and planning can lead to efficient successful resuscitations, improved ability to perform necessary tasks and increased error detection.

In the field of leadership, Yeung, Ong, Davies, Gao and Perkins (2012) showed the beneficial effects of team leadership skills as it pertains to cardiopulmonary resuscitation (CPR) with better technical performance, shorter pre-shock pauses, lower total hands-off ratio and shorter time to first shock (all of which are key performance indicators for successful CPR) achieved in groups

that displayed better leadership skills. The importance of team leadership skills in resuscitation was further emphasised by Saunders et al. (2021) who demonstrated that non-technical skills are fundamental to the performance of medical emergency teams in a ward based setting, whilst also demonstrating that the ad-hoc teams formed in the ward environment had poorer non-technical skills than previous studies surrounding ad-hoc teams within the emergency department. Factors that contributed to this difference included the negative impact of having too many people in a resuscitation and the positive impact of a team leader perceived to be experienced, knowledgeable and competent (Saunders et al., 2021). Leadership significance was further supported by a study from Marsch, Müller, Marquardt, Conrad, Tschan and Hunziker (2004) who concluded that an absence of leadership behaviour was associated with poor team performance. Ford, Menchine, Burner, Arora, Inaba, Demetriades and Yersin (2016) also explored the concept of leadership in trauma care, finding that it improves processes of care and that with training, trauma leadership can be further enhanced. Looking more specifically at team leader positioning, Kern, Tschan, Semmer and Marsch (2023) found that if positioned in the "hands-off" position (leading without touching anything), more leadership statements were made and leaders contributed more to their teams total number of leadership utterances. In particular, more statements relating to task distribution, anticipation and planning were made by leaders positioned in the "hands-off" position (Kern et al., 2023). However, in the CPR setting in which the study was based, the team leader position had no effect on the team's performance of CPR, which calls into question the value of positioning in this setting (Kern et al., 2023). Team preparation and allocation of roles can ease the challenge of initiating resuscitation and help to establish a structure in a high pressure environment (Gabr, 2019) which Hunziker, Buehlmann, Tschan, Balestra, Legeret, Schumacher, Semmer, Hunziker and Marsch (2010) showed with their work looking at role allocation in cardiac arrest teams. This study showed that ad hoc teams without prior role allocation made fewer leadership statements and had more difficulty establishing leadership, with less specific commands and task allocations made in ad hoc teams

without clear role allocation (Gabr, 2019). Team leaders need to overcome several barriers when leading a resuscitation, with Lauridsen, Krogh, Müller, Schmidt, Nadkarni, Berg, Bach, Dodt, Maack, Møller, Qvortrup, Nielsen, Højbjerg, Kirkegaard and Løfgren (2021) identifying overcrowding as the most frequently experienced barrier during resuscitation attempts.

The primary cause of patient harm in healthcare relates to errors in communication (Carne et al., 2012), highlighting its importance in general and more specifically in relation to resuscitation. Closed-loop communication, acknowledging different perspectives and aiming for assertiveness instead of aggression have been identified by Carne et al. (2012) as effective communication tools that are likely to result in more effective teamwork. Closed-loop communication is a description of the ability to deliver concise information, have the team member confirm that they have received that piece of information and then acknowledge the correct understanding of that information, effectively 'closing the loop' (El-Shafy, Delgado, Akerman, Bullaro, Christopherson, & Prince, 2018). Teams that communicate well are considered more efficient, as effective communication aids in coordinating and executing tasks and exchanging information (Breton, Kramer, Chamberland, Dubé, Chiniara, & Tremblay, 2012). In a resuscitation specific environment, Calder, Mastoras, Rahimpour, Sohmer, Weitzman, Cwinn, Hobin and Parush (2017) found that the use of a shared mental model was an effective communication strategy and that the team leader as well as the charting nurse were central in terms of their volume of communication. Not only was effective communication important, but it can be taught via simulation and was demonstrated by Breton et al. (2012) to improve qualitative and cooperative communication. An emergency physician perspective on what effective communication looks like in resuscitation was likely to provide valuable insights to registrars that will help improve their communication and thus their abilities as a team leader.

Regarding the need to allocate attention wisely and avoid fixation, another core CRM principle, there is a recognised tendency under stressful conditions to fixate on a single issue that lies

within the control of the stressed individual (Carne et al., 2012). In an aptly titled article “No simple fix for fixation errors”, Fioratou, Flin and Glavin (2010) defined a fixation error as that which occurs when doctors concentrate on a single aspect of a case, to the detriment of other more relevant aspects. This error was highlighted by the Elaine Bromiley case (Bromiley, 2008), a case in which Elaine was scheduled for a routine sinus surgery and ended up having an emergency airway problem that led to her death. The case, amongst other things, highlighted the devastating effects of fixation error as senior anaesthetists focused on the problem in front of them whilst ignoring the interjections of other colleagues that had highlighted alternative, safer options that likely would have led to a better outcome for the patient. As Elaine’s husband was an airline pilot with vast experience in the aviation industry, his tireless efforts to elicit change in the medical culture have had far reaching implications in the attitudes toward and culture surrounding errors in medicine. Fioratou et al. (2010) identified that awareness is a general strategy to improve individual problem-solving skills within medicine in order to avoid fixation error. From an external perspective, Krage, Zwaan, Tjon Soei Len, Kolenbrander, van Groeningen, Loer, Wagner and Schober (2017) were able to demonstrate that non-technical skills were critical in blocking out external stressors to achieve a successful resuscitation, showing the importance of allocating attention wisely. Calder et al. (2017) highlighted that an overall awareness of what’s going on around you, which they described as team situational awareness, was integral for successful resuscitation.

Calling for help early is a key skill for EP’s and has rare but important implications in resuscitation. Carne et al. (2012) have suggested that calling for help early was relevant to clinicians at all stages of training, including those in senior roles. At the senior level, reluctance to call for help early can occur due to a fear of being viewed as lacking in knowledge or being incapable of managing on your own (Carne et al., 2012). Criteria that remove these barriers have been implemented in conditions such as Stroke and Trauma (Carne et al., 2012), however such criteria would be difficult to apply to all resuscitations, given the variance in so many aspects of

the cases that could be classed as needing resuscitation. Interviewing specialist EP's and identifying the specific instances where they as senior clinicians have opted to call for help early will no doubt provide relevant examples to training registrars and give them the confidence to overcome the barriers to calling for help early.

Finally, Carne et al. (2012) explored workload distribution and monitoring and supporting team members and in the context of this study, focused on this skill as it relates to the individual patient. In this context, workload distribution can contribute to a more integrated and comprehensive approach and allows the team leader to maintain a general overview of both patient and situation, assisting with successful resuscitation. Marsch et al. (2004) also supported the importance of task distribution, demonstrating that an absence of explicit task distribution led to poor team performance. Regarding the different elements of teamwork during a resuscitation, Hosseini, Heydari, Reihani and Kareshki (2022) recently conducted a systematic review and meta-analysis. Hosseini et al. (2022) identified only a small number of relevant articles and concluded that more research is needed to reveal all the key elements of teamwork in resuscitation.

Leadership in the emergency department

Emergency medicine is a specialty that is known to have complex leadership demands (Rixon, Wilson, Judkins, Bonning, Skinner, & White, 2021), with a study by Rixon, Wilson, Hussain, Terziovski, Judkins and White (2020) identifying a total of 47 different leadership challenges for directors of emergency departments and then highlighting four distinct challenges that face all EP's in leadership positions; administrative overload, overcrowding and access block, managing challenging colleagues and engaging with hospital executive. Emergency medicine is a specialty that is developing at an extremely rapid pace that appears to exceed the development of many other medical specialties (Lateef, 2018) and this is due to many factors including technological advances, improved transport to hospitals, specialisation of the medical workforce as a whole, the increased recognition of the effectiveness of emergency medicine treatments and a general

explosion of evidence-based medicine (Cameron, 2014). To be a successful leader in the ED, the leader must manage undifferentiated, complex conditions in a shift pattern that extends for 24 hours a day with the ability to make quick and accurate decisions in an ever changing and rapidly evolving environment, both in regards to changes hour by hour extending all the way to the rapid national and international growth and change seen in the specialty (Lateef, 2018). To be a leader in this environment is a skill that requires development throughout training and would certainly benefit from a deliberate focus given that the assumption amongst many EP's is that these skills will automatically be present as they become more senior, will naturally develop over time and do not require dedicated time to train (Lateef, 2018). In stark contrast to these long held beliefs, Avolio, Reichard, Hannah, Walumbwa and Chan (2009) demonstrated that participation in leadership training was important for leaders performance and overall team effectiveness via a meta-analysis of leadership impact research. Whilst this was not specific to the field of medicine, it provides a basis for future research looking at the impact of leadership training in a medicine and emergency medicine specific context. Frich, Brewster, Cherlin and Bradley (2015) highlighted a lack of programs and limited use of interactive learning and feedback to address this deficiency in leadership development. It was also important to note that no single learning strategy was sufficient to be a competent ED leader, and that any leadership training curriculum needs to be dynamic and flexible (Lateef, 2018). Leadership development was essential to the growth of emergency medicine registrars, with Rixon et al. (2021) noting that leadership development was crucial to enhancing the sophistication and effectiveness of emergency medicine leadership.

Simulation Based Education

Resuscitation of the unwell patient is a sometimes-infrequent event yet is a critical skill to learn as an emergency physician. As such, developments have been made in medical education to incorporate SBE into the educational framework. SBE allows deliberate selection of cases relevant to a registrars stage of training and competence levels, can be flexible with the work

and training schedules of registrars and allows practice and errors to be made in an environment that doesn't affect patient safety (Mundell, Kennedy, Szostek, & Cook, 2013). SBE can come in many forms and in more recent times the addition of technology has been shown to have better outcomes in relation to improvement of knowledge, skills and behaviours as well as moderate improvements in patient outcomes when compared to education delivered without the assistance of technology (Cook, Hatala, Brydges, Zendejas, Szostek, Wang, Erwin, & Hamstra, 2011). Mundell et al. (2013) showed that simulation-based resuscitation training was highly effective when compared to no intervention. They also demonstrated process skill outcomes were much better when teamwork and other team management elements were incorporated into the simulation education (Mundell et al., 2013). More research is required to determine a true cost-benefit assessment of resuscitation-based simulation education (Mundell et al., 2013), but at its core it is an intervention with proven effectiveness. Thus, developing further educational resources to enhance this form of education was likely to provide additional educational benefits. There was a significant amount of literature surrounding the role of SBE in the teaching of technical skills, but its applications for non-technical skills training have not been researched as extensively (Zhang, 2023). Zhang (2023) conducted a thorough review of how SBE focused on non-technical skills has progressed over the last 20 years and discovered that high-fidelity simulation (a simulation with a high degree of realism and a high degree of exactness achieved, regardless of the modality (Carey & Rossler, 2023)) is the most frequently deployed method of simulation training used to attempt to enhance non-technical skills. Zhang (2023)also noted that SBE needs to be considered as a teaching approach that substitutes high acuity, low occurrence (HALO) situations in both technical and non-technical simulations.

SBE has been well established in postgraduate training of EP's in Canada (a health system with many similarities to Australia and the United Kingdom) for some time now (Russell, Hall, Hagel, Petrosoniak, Dagnone, & Howes, 2018). In certain postgraduate education contexts, simulation has been shown to be superior to traditional clinical education (Russell et al., 2018). It has been

well documented how simulation can be integrated into emergency medicine programs, providing an evidence-based approach for incorporation of SBE into a training program (Binstadt, Walls, White, Nadel, Takayesu, Barker, Nelson, & Pozner, 2007; Dagnone, McGraw, Howes, Messenger, Bruder, Hall, Chaplin, Szulewski, Kaul, & O'Brien, 2016). SBE also forms a part of the Australasian College of Emergency Medicine (ACEM) Fellowship curriculum which states that structured education programs must include SBE to encompass pathologies and situations that are either very uncommon or carry a particularly high risk to patient safety (ACEM, 2023). The curriculum goes on to say that SBE "provides invaluable opportunities for development and assessment of knowledge, technical and non-technical skills and critical prioritisation, decision-making, teamwork and collaboration skills" (ACEM, 2023, p. 13).

After establishing the benefits of SBE and the importance of embedding it into a curriculum, the next area of focus is the simulation itself and the design and execution of the simulation. Three key elements are necessary for an effective simulation; preparation, active participation and post-simulation debrief (Forrest & McKimm, 2019). The preparation phase involves determining appropriate learning objectives, writing scenarios, ensuring there is an appropriate space, ensuring all equipment is ready, and providing simulation participants with presession materials. Gutierrez et al. (2023) have identified that the inclusion of online presession modules led to optimisation of cognitive load and improved performance in the simulation environment. This work highlighted the importance of presession materials. Active participation in a simulation scenario was multifactorial. It was improved when simulation educators had defined learning objectives that were made clear to participants, when the simulation was high fidelity and when the simulations were well written and properly facilitated. All of these factors can lead to increased engagement from participants (Forrest & McKimm, 2019). Every simulation should then be concluded with the provision of feedback in the form of a post-simulation debrief (Forrest & McKimm, 2019). Debriefing is an interactive dialogue, more like a conversation that allows educators and learners to reflect on and explore key aspects of their performance

(Strother, 2021). There are many different templates available for debriefing and whilst guidelines exist which outline what makes a debrief effective, debriefing practices remain highly variable in their approach (Strother, 2021), due to variability in the simulator course (medical vs crisis resource management based (Dieckmann, Molin Friis, Lippert, & Østergaard, 2009)) the clinical scenario, the debriefer, the learner and the learning objectives (Strother, 2021). This variation does not detract from the value of debriefing but highlights the importance of using the right debriefing tool, debriefing structure and debriefer with the right group of learners to enhance the effectiveness of the simulation in achieving the learning objectives. Whilst multiple debriefing tools exist, the PEARLS (Promoting Excellence and Reflective Learning in Simulation) healthcare debriefing tool has been supported as a tool specifically suited for debriefing non-technical skills in trauma courses (Botelho, Yanchar, Abib, Bank, Harley, & Poenaru, 2022).

SBE focusing on non-technical skills is a concept that has been transformed over the last 20 years. Zhang (2023) highlighted in a comprehensive review that improved simulation technology, coupled with an increasing focus on medical error and acknowledgement of the importance of human factors and non-technical skills has seen significant advances in the quantity and quality of non-technical skills-based simulation. Despite this, Zhang (2023) points out that this is an area of study that has received very little attention in emergency medicine specifically. This dissertation aims to add to the growing body of literature regarding simulation and non-technical skills.

Burnout

Amongst the many difficulties faced by emergency registrars, one that has gained prominence in the last decade is the issue of burnout. Burnout is “a syndrome of emotional exhaustion, depersonalisation and a reduced sense of personal accomplishment” (Arora, Asha, Chinnappa, & Diwan, 2013, p. 491). Factors within the workplace that increase the risk of burnout include work overload, a lack of control, conflicting values, insufficient rewards, a lack of fairness and a lack of community (Arora et al., 2013). Physicians are at increased risk of burnout compared

with non-medical professions and EP's are significantly more burnt out compared with their emergency nursing colleagues (Arora et al., 2013). Zhang, Mu, He, Cai and Li (2020) examined the prevalence of burnout amongst emergency physicians via a meta-analysis and systematic review, finding that approximately 40% of EP's report experiencing burnout. Kimo Takayesu, Ramoska, Clark, Hansoti, Dougherty, Freeman, Weaver, Chang, Gross and Yarris (2014) found a burnout prevalence of 65% when examining 8 emergency medicine resident programs in the United States (equivocal to an emergency registrar training program in Australia). Whilst both figures are startlingly high, the figure amongst training emergency physicians speaks to a problem that needs to be addressed.

Grech (2021) recently assessed the effect that the educational environment can have on burnout in registrars and during this assessment, noted that doctors are exposed to significant emotional burdens, citing the example of the death of a patient, and advocates for support from counsellors when these difficult situations are encountered. As above, Grech (2021) also identified that registrars often feel a lack of control in decisions about care, their schedule and their work environment. Kimo Takayesu et al. (2014) identified improving autonomy, increased supervision and instruction on medical decision-making (which they theorised may provide the residents with an increased ability to manage risk tolerance) and increased social supports as key factors to address this alarmingly high report of burnout amongst trainees. When speaking about insufficient rewards, Grech (2021) theorised that providing teaching from more senior doctors could serve as a non-financial reward that registrars would appreciate. When registrars feel unsupported, underappreciated or isolated, it was identified that training in non-technical skills could enhance communication and improve registrars ability to interact positively with patients and also support one another (Grech, 2021). At an educational faculty level, it was stressed that faculty be educated on the extent of burnout and how to identify it as well as serving as role models for self-care to reduce burnout amongst faculty (Grech, 2021).

Grech (2021) finishes by stating that more research is needed to identify which interventions have the highest potential of reducing burnout amongst registrars. An area that shows significant potential is a focus on emotion regulation strategies proposed by Martín-Brufau, Martin-Gorgojo, Suso-Ribera, Estrada, Capriles-Ovalles and Romero-Brufau (2020). They identified in their article that emotional suppression was associated with more burnout whereas cognitive re-evaluation strategies led to a decrease in burnout. Emotional suppression is characterised by inhibiting true emotions and displaying feelings that the physician feels are necessary for a particular situation (Martín-Brufau et al., 2020). Cognitive re-evaluation on the other hand involves reevaluating a particular situation to give it new meaning which leads to a change in the emotional response that the situation produces (Martín-Brufau et al., 2020). The underlying theory as to why cognitive re-evaluation is an effective strategy stems from work by Hülsheger and Schewe (2011) who suggest that re-evaluation leads to a change in the experienced emotion whereas emotional suppression does not.

Successful resuscitation

A term I had used throughout the introduction and continued to use throughout this dissertation was 'successful resuscitation'. As an emergency physician, I am always striving for success, with each patient, for each shift and for all the non-clinical work that has happened throughout my career to date. But a successful resuscitation is a contentious term and a difficult thing to define. In cardio-pulmonary resuscitation (CPR), success is achieved with Return Of Spontaneous Circulation (ROSC) (ANZCOR, 2024). CPR is commenced when a person has no pulse and no signs of life, and can be determined to be successful and can be ceased when a pulse can be felt (ANZCOR, 2024). However, after ROSC is achieved, a recent study showed that only 24% of patients in whom ROSC is achieved are discharged from hospital alive and without severe neurological disability (Angus, 2015). Severe neurological disability is a term which considers mobility, intellectual disability, communication difficulties and increased care needs, and is a term which has also been difficult to define despite its prominence in medical literature.

Allen, Molloy and McDonald (2020) cite a lack of systems for quantifying severity, which disorders of the neurological system should be included, whether this should be described in terms of functional limitations and the domains of functional impairment that are most important in the classification as reasons for the lack of an agreed definition. Beyond this definition, success in resuscitation lacks an evidence-based definition which was not unexpected considering the incredible breadth and depth of patients, cases and conditions which can be placed under the umbrella term of resuscitation, making cognitive re-evaluation of this situation extremely challenging.

Educational Theory

As a phenomenological study focused on the lived experience of expert practitioners and the tools that they use to be successful, it was clear that educational theories with a focus on active learning would provide a framework to assist in interpretation of the results of the study and application of the results to future learners (Pardjono, 2016). There are multiple theories potentially applicable to this dissertation which I have explored. Millers pyramid of clinical competence, pictured in Figure 4 emphasizes guided learning but is more applicable for assessment design than for the context of this dissertation (Witheridge, Ferns, & Scott-Smith, 2019).

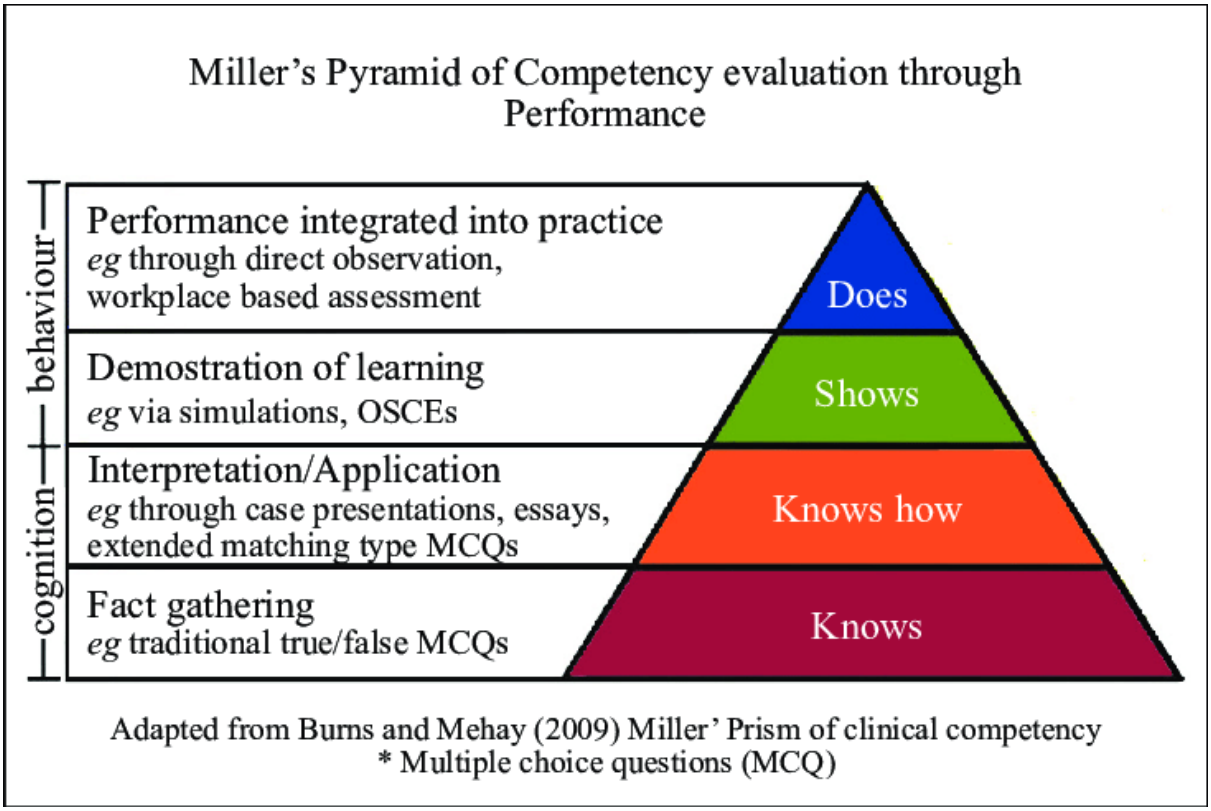

Figure 4. Miller's Pyramid of Clinical Competence (Corbetta, 2019)

Vygotsky's ZPD was the educational theory that served as an appropriate framework to support my discussion. The concept of the ZPD was summarised by Vygotsky himself as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Kozulin, Gindis, Ageyev, Miller, Pea, Brown, & Heath, 2003, p. 40). It is the virtual space between what a learner has already acquired and what they are not yet able to achieve, and Vygotsky's work more specifically related to bridging that gap via learning from more experienced practitioners. In a medical context, this idea promotes the concept that cognitive growth occurred when there was an interactive exchange between a learner and a more proficient person (Shabani, Khatib, & Ebadi, 2010). An intimate knowledge of this space allows the educator to determine the amount of assistance that the learner needs and the necessary steps that need to be taken in order to bridge that gap. This theory had also been linked to the concept of constructive and destructive friction (ten Cate, Snell, Mann, &

Vermunt, 2004). Constructive friction occurs when the learner is taken out of their comfort zone but is supported by their senior peer to achieve something they were previously not able to achieve. If the developmental learning is not carried out correctly because of a lack of support or an attempt to teach a concept that is too far beyond what the learner already knows, it can however lead to destructive friction and a failure to achieve the intended educational outcomes. The inherent educational challenge that made this theory so interesting and valuable, was to find the perfect balance between taking the learner out of their comfort zone but not pushing them to the point of destructive friction. My belief was that the experiences of EP's and the new understanding gained from exploring that experience will give simulation educators the necessary tools to create constructive friction and avoid destructive friction.

Kolb's learning cycle, pictured in Figure 5, is another educational theory that focuses on active learning and is a cycle that often occurs within clinical practice and whilst is it relevant to this dissertation, I feel that Vygotsky's ZPD is a more relevant framework better suited to the modality of simulation related to non-technical skills practice.

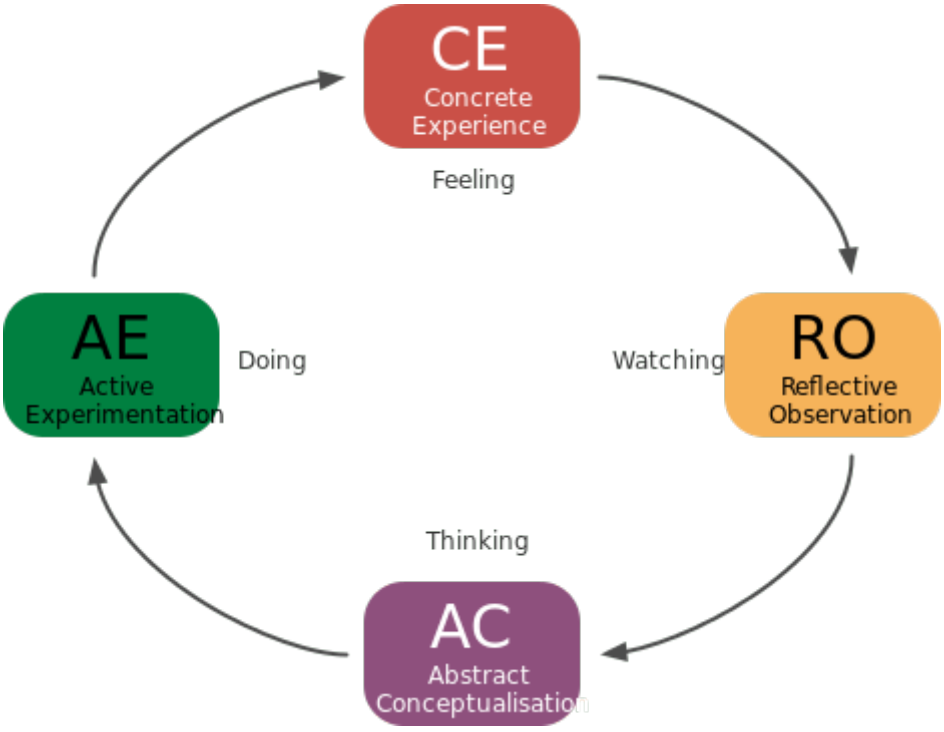

Figure 5. Kolb's learning cycle (Carley, 2015)

Other theories that I examined when determining which theory to use as my framework included Cognitive Load Theory (Young, Van Merrienboer, Durning, & Ten Cate, 2014) (discounted because of its suggestion that excessive guidance can lead to cognitive overload and impede learning, contrary to the proposed outcome of this dissertation), Self-Determination Theory (SDT) (Ganotice, Chan, Chan, Chan, Fan, Lam, Liu, Wong, Yuen, Yuen, Yeung, Nalipay, Tsoi, & Tipoe, 2023) (not used due to its focus on self-determination and its opposition of external guidance) and Piagetian theory (Kirch & Sadofsky, 2021) which emphasises self-directed learning and is more applicable in the field of Problem-Based Learning (PBL). All other theories that were explored lacked the interactive exchange between the learner and the more proficient person and thus Vygotsky's ZPD is the most appropriate framework for the discussion to follow.

Research Questions

An in-depth literature review has led me to development five key research questions that will guide the remainder of this dissertation.

1. How do emergency physicians utilise the principles of crisis resource management in the resuscitation of the unwell patient?
2. Are there common themes present amongst emergency physicians during a resuscitation regarding how they interpret and apply the principles of crisis resource management?
3. What recommendations do experienced emergency physicians have for emergency registrars learning to be resuscitation team leaders?
4. What outcomes do emergency physicians aim for when performing resuscitations, what do they deem a successful resuscitation and why?
5. How can the experience, common themes and advice from emergency physicians enhance the training of emergency registrars as resuscitation team leaders?

Methodology

I chose a qualitative research approach to this study because it is an exploration of the lived experience of EP's during resuscitation. Qualitative research in medical education is the method of choice when exploring experiential phenomena in their natural settings as well as studying the human experience (Sawatsky, Ratelle, & Beckman, 2019). Common to all qualitative research is the principle that the object of the study is explored in its natural environment (Swanwick, 2013). My goal for this research was to understand the complexities of leading a resuscitation as an emergency physician and by using a qualitative approach, I aimed to gain a rich textured account of what this phenomenon is like, particularly in the context of CRM (Swanwick, 2013).

The research methodology that I have chosen within the framework of qualitative research is phenomenology, specifically interpretative phenomenological analysis (IPA) which I will examine in more detail shortly. To provide context, I examined the underlying theories of the seven qualitative research approaches suggested by Swanwick (2013). Ethnography involves the study of the daily activities of a particular social group (Hammersley & Atkinson, 2019), and whist my study specifically focuses on Fellows of the Australasian College of Emergency Medicine (FACEM's) practicing in a definite work environment (resuscitation) and thus has an ethnographic component, it is the lived experience rather than the social context which I feel will add the richest data regarding the use of CRM principles and its applications in the education of emergency registrars. I don't plan to generate any new theories or explore any specific case studies which would exclude grounded theory or case study as suitable methodologies (Swanwick, 2013). Along similar lines, there is very little narrative throughout the interview process, I don't plan to explore any political or historical aspects of the phenomenon and do not plan on eliciting any social change which also excludes hermeneutics, narrative

research and action research (Swanwick, 2013). It is for these reasons I have chosen phenomenology as the methodology of choice over other qualitative methodologies.

Phenomenological research aims to understand the essence of a social phenomenon from the perspective of those that have experienced it (Creswell, 2017). It focuses on the world as it occurs to research participants, and then analyses the phenomena from the perspective with which it is encountered by the research participant (Rietmeijer & Veen, 2022). Phenomenology is concerned with phenomenon that we have immediate access to without using any pre-defined theoretical positions (Rietmeijer & Veen, 2022). In this way, a phenomenological approach is an ideal way to access the approach of a FACEM to the resuscitation of an unwell patient. In this situation, when the physician is faced with a patient their immediate actions, the strategies they use, and their interpretation and commencement of tasks is a phenomenon that only the physician themselves have immediate access to. Using a phenomenological approach in this context allows the researcher, through interpretation and thematic analysis to gain access to some of the complexities involved in this phenomenon.

Within phenomenology, there exists three separate approaches; descriptive, interpretive and existential (Biemel & Spiegelberg, 2024). Descriptive phenomenology is more appropriate to use when the subject being studied lacks an evidence base, which allows the researcher to describe the findings, free from the biases of prior knowledge about the subject (Lopez & Willis, 2004). An interpretive approach differs from descriptive in that the researcher has often created a hypothesis, has an in-depth knowledge of literature surrounding the subject in question and is providing an interpretation of the phenomenon in a specific context and with some pre-determined knowledge/biases about the subject (Lopez & Willis, 2004). Existential phenomenology focuses on creating a third way of being in the world (Pedersen, Grønkjær, & Delmar, 2022) and it is not particularly relevant to the context of this study. Given the amount of literature related to CRM and SBE, it would seem impossible to take a purely descriptive

approach to this phenomenon. An interpretive approach allows me as the researcher to collect rich data from my participants and then to provide an interpretation of that data based on prior knowledge of the literature surrounding the phenomenon.

As I narrow the focus further still toward Interpretive phenomenological analysis (IPA), this is a personal perception or account of an object or event which produces subjective, context specific data rather than an objective statement about the object or event (Smith, 1996). It has a historical basis which dates back to the work of Husserl and Heidegger, two philosophers influential in the creation of phenomenology as a research methodology (Eddles-Hirsch, 2015). Heidegger in particular shifted the focus from the descriptive style proposed by Husserl to interpretive phenomenology with an emphasis on the relationship between the individual and their "lifeworld" (Lopez & Willis, 2004). He emphasised that individuals are influenced by the world around them, rather than exerting influence on their external environment (Lopez & Willis, 2004). In the context of this study, as the team leader in a resuscitation, there are an enormous number of external influences that determine how each individual reacts to that specific situation and thus the study of this phenomenon aligns much more strongly with the Heideggerian approach to phenomenology. He also insisted that it is "impossible to set aside one's own presuppositions and beliefs" (Eddles-Hirsch, 2015, p. 253). In my personal context, I have a familiarity of the literature surrounding CRM and resuscitation as well as an intimate knowledge of what it is like to be a team leader in the resuscitation of an unwell patient, having personally filled that role on many occasions as part of my clinical work. Thus, as the principal researcher, I am unable to set aside my own presuppositions and belief's and conversely am well placed to provide a thorough, context specific interpretative analysis of the phenomenon being studied.

The decision to use this particular methodology is underlined by specific ontological, epistemological and axiological assumptions. I have chosen to approach this research through a

framework of constructivism/relativism from an ontological and epistemological perspective. Constructivism is based on the viewpoint that all knowledge is socially constructed, rather than something that can be discovered (Swanwick, 2013) and that meaning is constructed from the world that already exists rather than being created (Swanwick, 2013). This can be applied to phenomenological studies that examine phenomenon occurring in their natural environment and analyse data to clarify the knowledge and meaning that has been constructed by the social environment. In this case a phenomenological methodological approach with a constructivist perspective allowed me as the researcher, via the process of semi-structured interviews, to gather data about the phenomenon of being a resuscitation team leader in the social context of CRM, seeking to understand the meaning and knowledge that is constructed from the dynamic interaction between researcher and participant (Ponterotto, 2005). The ontology of constructivism in this case is relativism, a concept which assumes that there is no real world that pre-exists, rather that it is social and experientially based and is dependent on individuals, in this case the interview participants as well as the environment around them, for the form and content that fills the world (Swanwick, 2013). In a relativist perspective, people could potentially inhabit very different 'worlds' based on what is constructed by the social background that they sit within (Harper, 2011). I believe that EP's, working as team leaders in a resuscitation, inhabit a very specific 'world' that is unique in terms of their environment, team members, the patient they are treating as well as being unique for every individual physician and unique as a collective from different craft groups within medicine that also act as team leaders in resuscitation of the unwell patient. Because of this, a phenomenological methodology with a constructivist/relativist framework was appropriate as the methodology of choice to best explore this phenomenon and extract rich, meaningful data about the exclusive, socially constructed 'world' in which the research participants live.

Recruitment and participant selection

Participant pseudonym	Gender	Age	Years of experience as a FACEM	Clinical Setting	Formal leadership training
Finn	M	43	7	Rural/regional	No
Zac	M	34	3	Urban	No
Nigel	M	36	3	Urban	Yes
Nicholas	M	35	4	Rural/Regional	No
Lucas	M	43	4	Urban	No
Debbie	F	35	2	Urban	Yes
Akshay	M	45	7	Rural/Regional	Yes
Steve	M	46	7	Urban	Yes
Ken	M	63	21	Urban	Yes
Anil	M	45	5	Urban	No
Ruth	F	51	15	Rural/Regional	Yes
Lola	F	50	13	Urban	Yes
Dom	M	45	4	Rural/Regional	Yes

Figure 6. Participant demographics

Recruitment was conducted by emailing, communicating via WhatsApp or speaking in person to potential research participants and offering them the opportunity to participate. The chosen sampling method was convenience sampling, otherwise known as opportunity sampling, where participants were chosen based on ease of access (Cohen, Morrison, & Manion, 2007) . Participation was offered only to fully qualified FACEM's, all of whom were colleagues that I had either currently or previously worked with throughout my career. For those participants who expressed an interest, a participant information sheet (Appendix 1) and participant consent form (Appendix 2) were emailed to the participants prior to the interview so that they could familiarise themselves with the project and had a further opportunity to withdraw from the study if they desired. All participants were based in either rural or urban district hospitals, limiting the generalisability of this study to FACEM's working in different hospital contexts throughout Australia. Having said this, all study participants had either worked or trained in rural, urban and tertiary hospital environments at some point in their career. Female FACEM's were underrepresented in the study compared to the national average and FACEM's of various ages were adequately represented in line with national figures. More than half of the

participants had participated in further formal leadership training in addition to that provided as part of the ACEM curriculum. This data was collected to give a sense of whether participants had actively sought to further their leadership skills formally or not and whether this affected their responses during the interview process. All participants had spent at least 12 months at their place of work and stated that they were comfortable in the resuscitation environment in their workplace and familiar with their workplace. I chose this specific sub-group of doctors for the following reasons. I have practiced medicine in Australia and plan to continue my career in Australia at the conclusion of this course. For this reason, I wanted my participants to also be working in Australia to provide a familiar context and one that would be most relevant to my future clinical and educational career. I chose to only interview qualified specialists as the data I was seeking needed to have validity and I hypothesised that specialists in the field would provide increased validity compared to training specialists or junior doctors. Also, the phenomenon I sought to examine is one experienced much more frequently by specialists than by registrars. After completing my 13th interview, I felt I had achieved data saturation and halted any further recruitment.

Interviews

The research method I chose to collect my data was a series of one-on-one semi-structured interviews. The semi-structured interview has variation in its use of questions and prompts in order to draw the research participant more fully into the study, creating an immersive experience for both researcher and participant (Galletta, 2013). Semi-structured interviews are designed to elicit data grounded in the experience of the participant but are also guided by existing constructs within the field being studied (Cohen, Manion, & Morrison, 2018). In this study, the goal was to elicit the experience of resuscitation by the participants, guided by the existing construct of CRM principles, making semi structured interviews an excellent research method to achieve that goal. Galletta (2013) states that each interview question should have a

clear connection to the research, which formed the basis of the semi-structured interview questions I used to collect my data.

In designing my interview questions (Appendix 3), I designed each interview to commence with data collection around age, gender, job experience and workplace setting, both to establish each participants place within the study, whilst also acting as a natural beginning to the conversation and a way to build a relationship with each participant. Each question then had a specific link to one of the seven CRM principles; however, the structure was flexible depending on the direction the interview took and different prompts that were required for each participant in order to elucidate the most valuable data for each participant. The conclusion of the interview allowed participants to provide their own thoughts on aspects of the non-technical skills that would be beneficial to teach to junior registrars. Structuring the interview in this way allowed me to have a large bank of data for which I could provide my own analysis, as well as a small subset of data that allowed the research participants to provide their own needs analysis of future education, which I saw as a valuable addition as each interview participant was a specialist EP with a wealth of experience in emergency medicine from a variety of backgrounds. At the conclusion of each interview, I invited participants to comment on whether they thought that a successful resuscitation was based more on the performance of the team or the outcome for the patient. My goal with this question was not to define exactly what a successful resuscitation was, but merely to establish from a group of specialist EP's their thoughts in relation to this somewhat philosophical question. Interview participants were not given any definition of what a successful resuscitation was prior to asking that question, allowing their own internal definitions to guide their answers. Given the study's focus on resuscitation and the team leader role, my hope was that posing this question (particularly after an interview in which the participants have reflected deeply on their own resuscitative practices) would provide further insight into what outcomes they thought emergency registrars should be focusing on as they build their own resuscitation and team leader skills. This would then offer educational providers expertise that would assist

them in providing feedback that was focused on outcomes deemed to be of high importance by their emergency specialist colleagues. Each interview lasted between 15-30 minutes.

Data analysis

The method of data analysis I chose, having conducted all of the semi-structured interviews, was thematic analysis. Braun and Clarke (2006) define thematic analysis as a method for analysing qualitative data that involves analysis of a data set with the intention of identifying, analysing and reporting repeated patterns. It allows the researcher to interpret and describe data by selecting codes and constructing themes (Kiger & Varpio, 2020). Thematic analysis was identified as being particularly well suited to phenomenological methodology (Harper & Thompson, 2011). Thematic analysis also carries significant versatility with regard to paradigmatic orientation and can be used in many different paradigms including a constructivist/relativist paradigm, such as that outlined above (Kiger & Varpio, 2020). Fortunately, thematic analysis has also been identified as a good first analytic method for novice qualitative researchers such as myself (Clarke & Braun, 2017). Thematic analysis is both appropriate and powerful when used to understand a set of experiences, thoughts or behaviours and is designed to identify common and shared meanings (Kiger & Varpio, 2020). I chose a deductive approach to theme identification, using the pre-existing framework of crisis resource management principles to hone in on particular aspects of the data that related to each of the principles in question (Kiger & Varpio, 2020).

I undertook my analysis using the six step process outlined by Braun and Clarke (2006) in Figure 7.

Table 1 Phases of thematic analysis

Phase	Description of the process
1. Familiarizing yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

Figure 7. Phases of thematic analysis (Braun & Clarke, 2006, p. 87)

In Phase 1, I listened back to each interview several times, confirming that the transcribed data was accurate and at the same time absorbing the subtlety and nuance of the responses that was not necessarily always captured in the transcription. Moving on to phase 2, the initial generation of codes was made simpler by the fact that the interviews were generally broken up into questions about the seven different CRM principles and could be coded accordingly. This allowed me to "codify" the work so that it could be appropriately grouped in this fashion (Saldaña & Saldana, 2009). I added an extra code to encapsulate each specialist's specific advice to registrars, because whilst this had significant overlap with things already mentioned within CRM principles, it contained richer and more personalised advice. Generation of codes as well as all work related to themes was assisted with the use computer-assisted qualitative data analysis software (CAQDAS), facilitated by the NVivo program (Lumivero, 2024) and displayed in Figure 8.

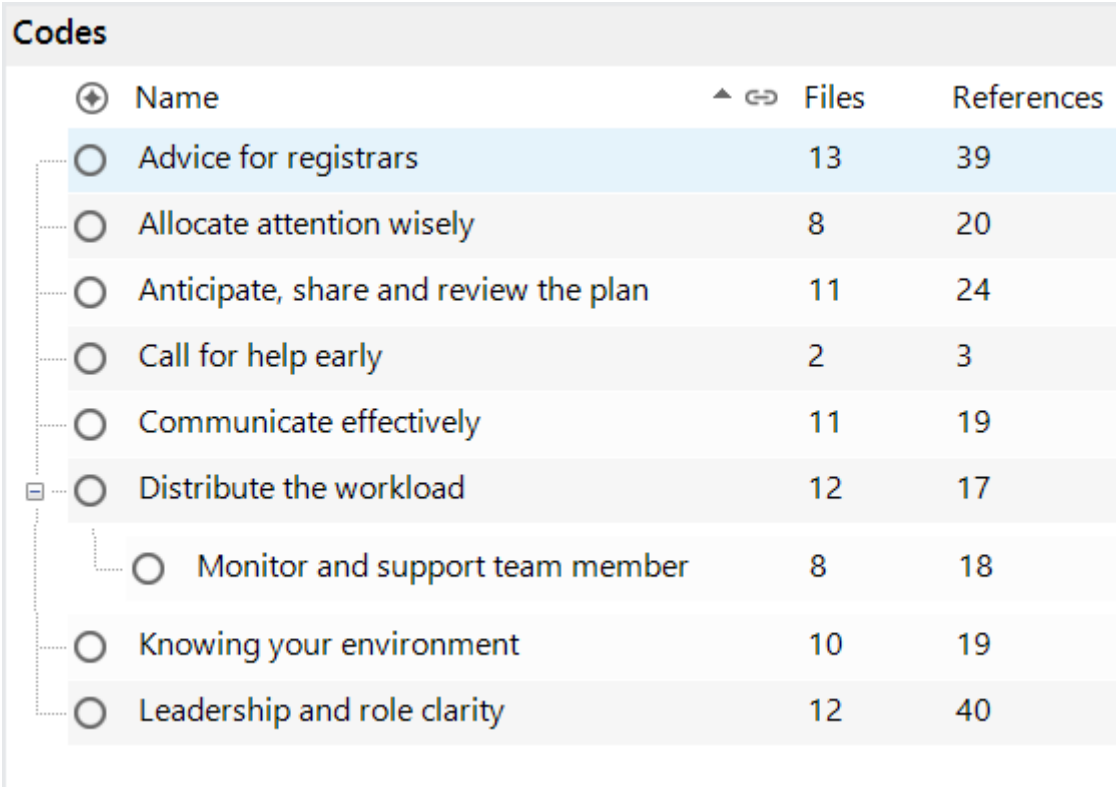

Figure 8. Examples of codes used

Once the codes had been generated and the interview transcripts had been reviewed and coded, I was able to enter phase 3. I began searching for themes within each set of codes as well as themes that permeated throughout all the responses of a particular participant and then more broad themes that were present throughout all the interviews. During phase 4, all themes were reviewed in order to create a thematic map of the analysis. The themes were then clearly defined and accurately named, allowing the production of the results section (Phase 6). For the presentation of data, I opted to refer to each interview participant by a pseudonym. This allowed the results to remain personal and allowed the reader to follow the narrative of each participant (Saunders, Kitzinger, & Kitzinger, 2015).

It was at this stage of the dissertation that my educational theory was activated. With a series of results relating to EP's usage of CRM principles, common themes amongst the group, specific recommendations for registrars and insights into EP's goals during resuscitation, I had the necessary tools to help registrars navigate the ZPD as it relates to non-technical skills in

resuscitation with the assistance of data from more experienced practitioners. I summarised this data into two different formats to allow both junior and senior learners to gain value from this dissertation.

Ethical considerations

I followed the process set out for all students reading for a MSc in Medical Education and completed and submitted the CUREC Form 1A to the Education Departmental Research Ethics Committee (DREC) for approval (Appendix 4). The confirmation of my ethics approval is outlined in Appendix 5. I completed the online "Research Integrity: Introductory Core Course" module which provided me with an excellent grounding regarding research ethics principles and allowed me to conduct the entirety of my research project with strict adherence to the principles contained within said module. I also familiarised myself with the Oxford University Research ethics policy (Oxford, 2022) to further ensure that my research was conducted ethically.

All interviews were conducted via Microsoft Teams and were recorded and transcribed using Microsoft Teams recording and transcribing software. Prior to the commencing each transcription, I confirmed with each participant that they had read the participant consent form (Appendix 2) and that they were happy to proceed with the interview. Audio was transcribed in full verbatim to encapsulate not only the words spoken but also to incorporate pauses, corrections and hesitations which may have added significance to what was said. All transcriptions were analysed whilst listening to the recorded audio to ensure that the data was transcribed correctly and to assist in familiarising myself with the data. Interviews were then saved on the secure Nexus 365 database to retain participant confidentiality.

All of the research participants were known to me and over half of the participants were interviewed during a time when we worked together at the same facility. Because of this, I was an "insider researcher" (McDermid, Peters, Jackson, & Daly, 2014) with an awareness and understanding of the organisation in which I was conducting research. However, as the research was of an in-depth, personal nature, knowledge of the organisation did not play a significant role

in the generation of the data that I was collecting. I attempted to mitigate for any potential power differential issues by ensuring all participants that this research was not a performance appraisal and would not affect their continued work with the organisation or our personal relationship whilst at work. In keeping the tone of the interview friendly, collegiate and engaging at all times, I attempted to mitigate the development of any power differential throughout the interview process, acknowledging that my monopoly over the interviewers' statements and control over the final outcome of the study creates a level of power differential that cannot be mitigated for.

In acknowledging that my own presuppositions and beliefs cannot be set aside, it is important to outline the axiological assumptions that I carry with me as the researcher on this project. I have engaged in self-reflection and analysed a database of core values to determine the five core values that most accurately reflect my own core values (Tools, 2024). These values were achievement, improvement, belonging, health and teamwork. These were values that are present in my everyday life, my work life and most importantly in the context of this research, were values that I bring to every resuscitation in which I am team leader. These values were highly important to me and I believe they are essential for a successful resuscitation. Acknowledging this bias allows me to bracket these values so that they don't interfere with my interview process or with my thematic analysis of the data once acquired.

Results

My data was coded according to interview responses that highlighted the use of each of the seven CRM principles in the practice of resuscitation, as well as a separate code for comments related to advice for emergency registrars. The data will be presented in that order and followed by data relating to participants responses to the final question regarding successful resuscitation.

Themes within each aspect of CRM principles

Know your environment

All of the research participants felt that knowledge of your environment was important in resuscitation. Many participants identified that they did not feel the need to familiarise themselves with the environment or equipment in order to team lead a resuscitation, Finn stating very confidently that "I'm pretty familiar with my own work environment". In contrast, three participants admitted that they were in need of a small refresher at times and Lola was adamant that she regularly familiarized herself with the equipment. Two participants identified that familiarisation with infrequently used equipment (resuscitaires for neonatal resuscitation, birthing kits and equipment for peri-mortem caesarean sections) was important but could often be done prior to a patient's arrival if given adequate pre-notification. The area which most participants felt was of greatest importance for them was knowing the team that they were working with. They listed factors such as ad-hoc teams and high turnover of staff as barriers to team familiarisation. Within the theme of knowing your team, Finn identified that specifically knowing the capabilities of individual team members, particularly in relation to their procedural capabilities, was a crucial piece of information that was important to know as the team leader. Learning the names of the key members within the team was also identified as an important aspect of knowing the team with Ruth volunteering unprompted that "for me, it's actually knowing the people in the team". Anil identified that modifying your environment e.g. moving

your patient from an unfamiliar environment to a familiar environment was a way to know your environment better. Focusing on noise reduction was identified as another way to modify your environment to assist with resuscitation. The predominant theme that emerged from this principle was “Know your team”.

Anticipate, share and review the plan

The use of recapping was mentioned most frequently by participants when asked about their use of this principle and its importance was identified in several different ways. Some participants stated that recapping helped them individually as a team leader, with Zac identifying that it allows him to centre himself on the key aspects of the resuscitation. He stated that “I like a recap and I think a recap centres me and focuses me even if it's just, you know, reiterating what we know”. He went on to identify that this can lead to increased team participation “I like the question that follows there of, can anyone think of anything we're missing, because I think there's only so many things I can remember in a given resus and I'm fearful that the one thing I forget is going to be something very simple and very dense that everyone else in the room is thinking”. Lucas also identified that when anticipating the next steps he derived significant benefits from “asking for feedback”. Finn used the specific phrase “it’s about that sort of anticipate, share and review the plan part of things”, revealing an intimate knowledge of CRM principles and displaying that for him CRM principles are prominent in his resuscitation approach. Debbie identified that recapping allowed her to use other individuals in her team as a ‘sounding board’ to ensure that plans that she had formulated made sense when stated out loud. Some participants took that process a step further, using recapping as a way to offload some of the decision-making burden and as a way to allow others in the room to share their ideas, utilising all of the human resources available to them. This process was also identified as a way to support other team members and to make them feel heard whilst in a resuscitation. This sharing of decision making and involvement of other team members was

also identified by Nicholas as a way to flatten the hierarchy and avoid situations in which team members felt that they couldn't speak up. He advised that as the team leader in this situation, self-awareness of any perceived or actual power gradient was crucial in flattening the hierarchy. On self-reflection, Nicholas identified himself as a quiet, controlled leader and identified that style as particularly helpful for him in dissolving any perceived power gradients. Recapping was also identified by many participants as a way to accurately plan the next steps of the resuscitation. Nigel stated that verbalising expected complications and sharing his mental model with the team allowed the resuscitation to flow more smoothly and that anticipating not only complications, but also important next steps (particularly following resuscitative procedures) was an important way to delegate tasks and avoid becoming task focused, which Debbie also identified in her interview. The key attitude and mindset that helped Ruth follow this principle was to constantly think "what's next" in order to be frequently reassessing the next steps in the plan. Akshay and Steve focused on this concept in more of a preparatory sense, anticipating complications before the patient had even arrived. The key overarching theme that emerged as the way to use this principle was "recapping" and it was identified as being important for the individual, the team and the team wellbeing.

Leadership and role clarity

Participants had a wide variety of responses as to how they display the principles of leadership and role clarity. Finn seemed very in touch with his only leadership personality, stating that "I've got a fairly loud voice, so I just have to be cautious of the fact that I'm not kind of talking over team members, that I'm allowing team members to the opportunity to feedback to me" and saw himself as an inclusive leader

> "I try and be as open and involve as many of my other team members as possible, allowing team members to the opportunity to feedback to me, be a focus for the resuscitation, take a step back from actually involving myself with the resuscitation, ensuring that there's good role clarity … a little bit further back from the patient if possible, from the foot of the bed if possible".

Zac shared similar insights

"Uh, I've obviously got a deep, loud voice which helps in in directing traffic, I try and be quite hands off as a team leader and you know I'll stand at the foot of the bed invariably with both hands behind my back holding a dect phone or my mobile phone in it to force me to have my hands off, but I think that position at the foot of the bed".

From this position, actions such as declaring that you were the team leader and identifying yourself by name (Nigel, Debbie, Akshay and Steve), taking the clinical handover (Zac, Nicholas), assigning roles to other members of the team (Nigel, Akshay, Lola and Dom) and seeking and allowing feedback were actions that displayed leadership. Participants then felt able to share specific qualities that they felt showed leadership. These qualities included being open and inclusive of other team members (Finn), delegating tasks and coordinating the resuscitative effort (Ken), taking ownership of the room and the decisions being made (Anil), controlling other team members that arrive once a resuscitation has commenced (Anil and Ruth), being assertive (Anil), sharing the same mental model (Ruth), having compassion and remaining calm (Ruth). The most dominant theme amongst participants was the assertion to remain "hands-off at the foot of the bed", however there were significant variations about what different participants valued most in terms of leadership.

Communicate effectively

All interview participants used the specific term 'closed-loop communication' when asked how they display the principle of communicating effectively. Within this dominant theme, Finn stated that it is important to ensure that all communication comes back through the team leader. Zac advocated for reducing the volume in the room and ensuring that only one conversation was had at a time to ensure that communications were not missed uttering "I'm not afraid of saying, Sorry!, is that something I need to know? Do you mind telling me or the group where it needs to be?". Along similar lines, Ruth identified the need to state "It's very loud. Can everyone be quiet? I just need to be able to concentrate on the important voices" in situations where the noise and activity in the room was becoming overwhelming. The concept of recapping was re-visited by many of the participants as they felt it was also relevant in relation to communicating

effectively. Zac also mentioned the need to identify and label 'critical moments' in a resuscitation by stating "this is a critical moment, can we have complete silence please?" and on reflecting, identified that it was a communication strategy that had been very effective for him in gaining control of the resuscitation in key moments. Ken stated that communication needs to be brief and succinct in order to be effective. Nigel advocated that a quiet environment and specific work around crowd control aided in effective communication. Nicholas and Akshay both identified the importance of task-specific communication. The underlying theme to communicate effectively identified by the interview participants was "closed-loop communication".

Allocate attention wisely

This principle was framed in the interview as maintaining situational awareness. Many participants sought clarification as to whether this was in the context of the ED as a whole or in relation to the specific patient whom they were resuscitating. Upon clarification that it was in relation to the specific patient, several key actions were identified. Zac identified delegation of tasks as a method that he used to avoid task fixation and loss of situational awareness. Zac and Steve both highlighted compartmentalisation as another key aspect of allocating attention wisely. Nicholas stated that dividing a resuscitation into small teams with specific tasks allowed those individuals and teams to be task focused, whilst the team leader maintained overall situational awareness and summarised the concept well in the following excerpt

> "The biggest challenges for situational awareness, I think as a team leader is to not get task focused. Reframing my own awareness of the whole room and the team and trying to work out where we are in the resuscitation and what our next three steps are".

Anil placed a large emphasis on prioritisation of tasks to avoid wasting time on less important tasks during a resuscitation and stated that he felt as though the team leader carried the main responsibility for prioritisation. The team leader's location within the room was again highlighted as a way to allocate attention wisely, with Debbie identifying that when she was at

the foot of the bed she could see and touch the patient, see all the team members and also see monitors that displayed key information about the patient. Recapping was once again mentioned as a way to maintain situational awareness. A global assessment of responses to use of this principle identified “task delegation” as the key theme.

Calling for help early

In general, participants appeared to rank ‘calling for help early’ as the least important CRM principle in relation to resuscitation of the unwell patient. This principle was rarely mentioned and was spoken about in detail by only two of the participants. Both participants who mentioned calling for help early identified its use in specific patient situations (neonatal resuscitation and resuscitation of the pregnant patient). One of those participants mentioned that identifying deficiencies in your own team that will require help from other areas of the hospital was the key step to take before deciding to call for help early. A lack of thorough responses prevented identification of a central theme for this principle.

Distributing the workload, supporting team members

Participants responses to this principle were detailed and varied but with several key themes. Regarding workload distribution, Finn, Zac, Ken and Lola identified task delegation to specific team members as important. Ruth and Nicholas specified further that allocating the tasks rapidly and ensuring that each task was very specific aided in the process of task allocation. Anil identified that knowledge of the skill set of each member allowed tasks to be distributed based on the needs of the team rather than focusing on the skills of one individual. Dom summarised the importance of the team very well in saying “I think one important thing is to recognize the strengths and the weaknesses of your individual team members”, harnessing the importance of teamwork. Regarding the support of team members the following important actions were identified; learning the names of team members (Akshay and Dom), acknowledging when team members were struggling and offering assistance and solutions, trusting your team members to

manage lower level decisions whilst maintaining oversight on higher level decisions (Lucas), giving others the opportunity to share their concerns and feedback (Finn), making an effort to make staff feel comfortable in the resuscitation environment (particular external staff members, highlighted by Akshay) and debriefing (Debbie and Lola). A specific area of team member support identified by Debbie was the management of incorrect suggestions. She highlighted the importance of acknowledging all input from team members whilst suggesting that redirection of some team members to a task likely to be more helpful was a way to manage an incorrect suggestion whilst maintaining control, but also morale of the team. Recapping was once again mentioned as a precursor to workload distribution that ensured that the distribution was performed effectively, particularly by Finn when stating “I tend to seek fairly frequent consensus with my team utilising recaps”. In summary, the theme of “specific tasks in a supportive environment” emerged.

Advice for registrars

Toward the conclusion of the interview, participants were asked to reflect on CRM principles and the non-technical aspects of resuscitation and then give their own advice as to the key non-technical skills that should be taught to emergency medicine registrars. Finn reflected on crisis resource management principles stating that “they’re good principles and they're well-worn for a reason because they do work you know”. He also stated that “the biggest transition from registrar to consultant is going from being an effective clinical doctor to becoming an effective clinical leader”. Finn had a depth of knowledge about CRM principles, and it was clear throughout his interview that he used them in his daily practice. Zac advised registrars to “do what feels comfortable to them” and reflected on the importance of the different exposures that registrars get to different leadership styles throughout their training, emphasising the importance of this as registrars develop their own leadership styles. Nigel highlighted positioning in the room, situational awareness and trusting your team as key aspects of CRM that he thought would benefit training registrars and echoed Zac’s sentiments regarding

intentional observation of other leaders and role models to help frame their own development. Nicholas focused strongly on flattening the hierarchy and the importance of humility. He also emphasised the importance of self-reflection when stating

> "You know not critically appraise but look back on a case and be really open to looking at things that you would do better, not just from a clinical point of view, but actually a lot of the non-technical skills. So you know looking back on it and going, this was a moment in time where we had half an hour that we just could have been better. You know, we could have done a bit better in this half an hour. What did we do wrong here?"

Lucas stated that "the biggest thing in the team leader role is that you need to be hands off". Debbie's advice came from a place of introspection, "I just remind myself that I've done this before and I can call for help if I need it". She highlighted recapping, closed-loop communication and anticipation and planning as her three most important CRM principles. Akshay implored registrars to have a strong focus on self-confidence, highlighting the importance for the whole of the resuscitation team to have a confident leader that they can trust. Steve painted a picture of the leader he envisages for emergency registrars,

> "be very clear in the communication to stand at the end of the bed and identify yourself as a team leader … by all means speak up and tell people to be quiet and that you're the team leader … just making the environment as sort of clear and controlled as you can in a chaotic situation and being very clear with your communication and just identifying yourself as a team leader".

Ken was quite prescriptive in his advice "I think they need to do courses in crisis resource management" before highlighting communication and debriefing as other important aspects for registrars to consider. Anil's advice focused on the ability to translate your internal thoughts to a display of leadership,

> "if you can organize your own thought process, then what you need to do is deliver that thought process in a very clear and concise way to the team … obviously closed loop communication, I think communication is very, very important. The message that should go out from the team leader is that you are in control as much as you are listening to everyone … if I was training a registrar I would tell them to effectively communicate their tasks. If you can remain calm, if you can remain hands off the patient and if you can listen to your team members and get all the cues and feedback that would help the team"

He also emphasised the importance of never ignoring your team members. Ruth stated that registrars need to "understand [their] own emotional response but understand how you control

your own response. You have to be humble enough to share but also know that you've still got to take that command because there has to be one person that is ultimately going to make a decision" whilst also emphasising that "there's not one way to lead". Ruth joined a growing chorus when stating "being able to stand back is one of the hardest things, to put your hands behind your back and not get involved". Lola focused less on specifics instead emphasising that "just being kind to each other is really, really the most important thing. Resus' aren't always associated with good outcomes, and I think that that's the hardest thing for people to manage. That is where we as clinicians really need to be kind in supporting each other". Dom was another to focus on the importance of regular huddles and summaries when giving his advice.

Successful resuscitation

I finished each interview on a reflective note, posing the same question to each participant "Is your assessment of a successful resuscitation based on the performance of the team or the outcome for the patient?". Participants were evenly split between the performance of the team, the outcome for the patient and both options. Finn reflected on this at length in the quote below

> "ultimately, if the team performs at its maximal capacity the best outcome for the patient will almost inevitably come from that. When the outcome is regrettably bad, as it sometimes is, but you as the team leader are comfortable and happy that the team has performed to its optimal capacity, then there's nothing more you can do. It's just one of those, you know, sad quirks of fate that sometimes we do our best and the outcome isn't fantastic. And that's one of the sad things that we all have to learn to deal with. That's one of the biggest points of trying to develop resilience as clinicians is dealing with tragedy despite our best efforts and it's one of the hardest things to do, that and coping with the uncertainty. That can be incredibly challenging for people who are used to their best always being good enough and used to always knowing the answer. It takes a sort of special set of cognitive skills to become an emergency physician because you have to be comfortable with that uncertainty and you have to be comfortable with some kind of best being good enough in the sense that you might not get the outcome you want even if you do your very best"

Zac reiterated this more succinctly in stating that "if you've had great teamwork and a bad patient outcome, you've probably done what you could do". Nicholas agreed, pointing out that

“I think more and more I have come to understand that the outcome is almost always out of our control”. Lucas was of a similar opinion, stating that

> “I think a highly performing team that works well together will also not always achieve the desired outcome. Sometimes there are patient factors that just can't be overcome and that requires a resetting of what the ideal outcome might need to be in that scenario. I guess you can't overcome everything. So yeah, I think that having a highly performing team is probably necessary to achieve a good outcome. But that it can't always achieve a good outcome or the desired outcome”.

Debbie focused her thinking when stating “Death is not necessarily a bad clinical outcome”. Participants who stated that both were equally important disliked the dichotomy of the question and felt that the focus on successful resuscitation should not be so singularly focused. Lola emphasised this by stating “I think you know it's vital to make a team feel that they have had a role in that participation and involvement and that has been valid and beneficial even if outcomes potentially weren't, but then also obviously patient and family focus”

Participants who stated that the outcome for the patient was more important generally displayed a desire to always remain patient focused, regardless of what factors may affect that patient outcome. This was outlined by Dom who stated “it's the outcome for the patient. You can't deny that”.

Discussion

The goal of this dissertation is to uncover knowledge about EP's experiences as leaders and their use of CRM principles in resuscitation, so that this can be used to inform the educational experiences of emergency registrars in the role of team leader. Through the process of semi-structured interviews and thematic analysis, I have identified several key points of discussion as well as some significant data that I intend to use in the development of new educational resources that utilise this information effectively. The discussion will be framed around providing the answers to my proposed research questions.

How do emergency physicians utilise the principles of crisis resource management in the resuscitation of the unwell patient?

The utilisation of crisis resource management principles in resuscitation was important for all participants, its use was varied amongst the respondents and clear similarities of practice emerged amongst all participants. In terms of knowing your environment, the majority did not feel the need to familiarise themselves with the physical environment, in contrast to recommendations in previous literature, but strongly emphasised the importance of knowing your team which was notably emphasised less in more general CRM literature. Regarding anticipation and planning, self-factors such as the HALTS factors were not mentioned by any participants, despite their importance for patient safety, nor were the use of checklists which have been demonstrated as being very helpful in performing several necessary tasks. Participants instead focused much more on recapping and shared mental models to anticipate and plan for issues likely to arise. There was once again a strong focus on the team and the health of the team in this situation. It is well established in the literature that leadership and role

clarity are important aspects of the team dynamic, but directions regarding a specific leadership style in resuscitation are absent. In this dissertation we have learned that some EP's are loud, assertive and take control of the room, others are more inclusive and supportive in their role, others are calm and compassionate and others still prioritise task delegation over any specific styles or emotional qualities. There is no specific leadership style that registrars must display, although all participants seem to agree that whatever your style, you must lead from the end of the bed, hands-off, not involved in active aspects of the resuscitation. Current literature suggests that team performance is not improved with team leader positioning at the foot of the bed (Kern et al., 2023), but the fact that all EP's who participated in this study valued it highly suggests that in a resuscitation specific context it remains very important to establish your position at the foot of the bed and remain hands off. In terms of effective communication, both the literature and the research participants agree that closed-loop communication is paramount and that a shared mental model aids in communication. A unique perspective that EP's in resuscitation situations identified was the importance of volume control and crowd control, in agreement with Krage et al. (2017) and their assertion that non-technical skills are critical in blocking out external distractions. I have discussed cases in the literature which highlight the importance of situational awareness and the perils of fixation error. Participants focused strongly on task delegation as the major strategy that they used to avoid fixation errors which provides a potential strategy or "fix" for the fixation errors highlighted by Fioratou et al. (2010). Calling for help early seems to be strategy that EP's tend to avoid in resuscitation, only utilising this CRM principle in rare specific circumstances where expertise and specific nuance is required. This is contrary to the literature which identified that calling for help early is important at all levels of seniority (Carne et al., 2012), however specific barriers to calling for help early were not explored with the research participants, leaving an opportunity for further specific research in this area. Exploring the final principle, distributing the workload and supporting team members, task delegation was once again a focus, consistent with literature highlighting its

importance. The other major discussion point amongst participants were the various strategies used to support the team. These strategies (e.g learning names, acknowledging the perspectives and feedback of others, making an effort to create a supportive environment) have not been specifically researched but are of obvious importance to EPs in a resuscitation situation.

Are there common themes present amongst emergency physicians during a resuscitation regarding how they interpret and apply the principles of crisis resource management?

Five common themes emerged from the interview process as a whole. These themes were shared mental model, positioning in the room, task delegation, positive team interaction and closed loop communication. These themes will be used in the development of educational resources outlined below.

What recommendations do experienced emergency physicians have for emergency registrars learning to be resuscitation team leaders?

The recommendations provided by experienced practitioners for emergency registrars learning to be resuscitation team leaders provides the knowledge that allowed me to activate the underlying educational theory of the ZPD. This advice, coupled with the insights explored earlier, can assist registrars in bridging the ZPD and developing as resuscitation team leaders. Focusing on leadership development in this way serves to reinforce the earlier assertions regarding the importance of leadership training and its beneficial effects on leadership performance, overall team effectiveness and the sophistication and effectiveness of ED leadership. It can also lead to the creation of leadership programs needed to address the concerns raised by Frich et al. (2015) about a lack of leadership development.

Several EPs reinforced the importance of key aspects of CRM principles discussed above (positioning in the room, recapping, closed-loop communication, supporting team members). However, there was also other advice not specifically related to these principles that can add value for emergency registrars learning to be team leaders. Regarding leadership development, participants advised the registrar cohort to engage in active and purposeful observation of EP's leading resuscitations, with two separate participants identifying this an informal way to engage in leadership development. Participants highlighted the importance of variety in leadership styles, identifying that an acknowledgement of this by registrars is likely to aid in the development of their own unique leadership style. This informal approach also avoids the identified issue of a lack of leadership programs. Several participants highlighted the importance of what can be broadly classed as cognitive re-evaluation strategies which had been highlighted earlier as a potential way to combat the negative effects of burnout. Nicholas spoke of the importance of self-reflection, Debbie reflected on the importance of positive self-talk, Akshay advocated for the importance of self-confidence, Ruth emphasised a need to understand your own emotional response and Lola highlighted the need for kindness. These reflections and pieces of advice collectively emphasise the importance of cognitive re-evaluation as well as providing some real-world examples of how EP's engage in this in the resuscitation environment, providing a blueprint for registrars to follow whilst also providing a variety of solutions, akin to earlier assertions about variety in leadership styles.

What outcomes do emergency physicians aim for when performing resuscitations, what do they deem a successful resuscitation and why?

Before engaging in a discussion about successful resuscitation as defined by EP's, I must engage in some reflexivity and acknowledge my own biases. When pondering the question about what determines a successful resuscitation, personally I think that it is based far more on the

performance of the team than the outcome for the patient. The patient is central to the practice of emergency medicine, and I strive to do everything I can for my patients. However, when reflecting on the challenges I have faced and continue to face in my own career, far and away the biggest challenge I foresee in my future is avoiding burnout. Whilst being the team-leader in a resuscitation is a core part of emergency medicine and something that is exhilarating and can be rewarding, it is also an example of a high-stress situation with a heavy workload and potential for highly emotional outcomes. Negative experiences in resuscitation can contribute significantly to physician burnout. Reflecting on my own practices, I notice that focusing on the performance of my team allows me to focus on what can be controlled and what can be improved. In this way, I find I am able to deal with negative outcomes for patients, comfortable in the knowledge that my team and I did everything we could to achieve the best possible outcome. Whilst this strategy may not work for everyone, as demonstrated by the variance in responses amongst the research participants, I think it is useful for registrars to be aware that EP's respond differently in the same situation, that no specific way is correct and that finding your own approach is important. More importantly than finding one specific approach, I am an advocate for emotional intelligence and a strong sense of self, in addition to the earlier focus on cognitive re-evaluation. I believe that identifying how you respond after a resuscitation and which strategy works for you personally will allow you to process these events in a positive way and is a crucial step in avoiding burnout in these highly moving career moments. Several participants mentioned the importance of supporting team members after a stressful resuscitation through the process of debrief, regularly checking in and ensuring that team members have support if they need it. Interestingly, despite this strong interest in the wellbeing of others, none of the participants focused on the importance of looking after themselves, despite it being identified as a critical part of the anticipation and planning phase prior to a resuscitation (Carne et al., 2012) and an important part of self-reflection and recovery after a stressful event. This subtle finding

throughout the interviews highlights the need for emotional intelligence and self-care amongst EPs in this highly stressful environment.

How can the experience, common themes and advice from emergency physicians enhance the training of emergency registrars as resuscitation team leaders?

The themes outlined above, when considered in the context of the entire dataset, can drive an update to the FACEM curriculum, thereby enhancing the educational experience of emergency registrars. The FACEM curriculum, reviewed biennially by the Council of Education to ensure it remains current (ACEM, 2023), details the essential knowledge for effective team leadership. Learning objectives such as "3.6 Perform as a good team leader in a variety of ED settings," "3.13 Deliver pertinent, clear, concise, and explicit instructions as a resuscitation team leader," "4.12 Employ active listening as a resuscitation team leader," "4.13 Provide positive messages to encourage their best performance," and "3.14 Seek verbal confirmation from team members to ensure instructions are understood as a form of closed-loop communication" (ACEM, 2023, pp. 124-126) emphasize many of the identified important themes. These objectives can be achieved through a Structured Education Program (SEP), delivered at accredited training sites, which mandates the inclusion of simulation-based education (SBE) and highlights the importance of non-technical skills. Focusing on enhancing the SBE program will allow the newly acquired learnings to be practically and broadly applied.

As outlined in the introduction, emergency registrars progress through their training over a 4-year period. SBE plays a role throughout those 4 years and takes on a different role as each registrar progresses. Kester-Greene, Filipowska, Heipel, Dashi and Piquette (2021) explored the perceptions of emergency medicine registrars regarding SBE, finding that junior registrars prefer to have more preparatory material to avoid feeling overwhelmed, while senior registrars enjoy

being challenged as it better mimics situations they will soon encounter as a specialist. This concept relates back to Vygotsky's ZPD and the importance of creating constructive rather than destructive friction. With this in mind, my aim was to create a framework applicable to a multitude of simulations that incorporate presession materials to assist junior registrars in developing their knowledge of crisis resource management principles and how emergency specialist apply them as well as a debriefing tool that incorporates the major themes identified to allows senior registrars to reflect after simulation as to where their remaining deficiencies are and what can be done to improve them.

Integration of the data above does not require an entirely new simulation program. Simulation programs are present in almost every emergency department throughout Australia and include high-fidelity simulations as part of these programs in most instances, a simulation method known to be beneficial for the development of non-technical skills (Zhang, 2023). My proposal is to integrate pre-session materials and post simulation debriefing tools into the existing simulations and merely shift the focus from enhancing technical skills to focusing on non-technical skills with user-friendly materials that will enhance the educational experience for registrars and further develop their non-technical skills.

Presession material

The results of this dissertation have provided some detailed insights into how EP's use crisis resource management principles during resuscitation. These insights have allowed me to develop a framework that medical educators across Australia can use when setting up non-technical skills-based simulation as part of their local SBE program. The purpose is not for this framework to be prescriptive, but rather to outline key concepts and allow local medical educators to build on this framework and apply it to their specific context, particularly regarding the seniority of their registrars. The framework is illustrated in Figure 9.

Figure 9. Example of presession material

It mentions all seven of the key principles of crisis resource management, adding the specific things that EP's highlighted as most important within each principle. It is designed to be brief and easy to read so as to avoid information overload. Sbaffi, Walton, Blenkinsopp and Walton (2020) recently explored the concept of information overload in emergency medicine. They discovered that EPs are deeply affected by the ever-increasing amount of medical information and that it is intruding on every aspect of their job. To avoid contributing further to this issue, this document is impressive in its brevity whilst still communicating the important points. Other resources that contain a more in-depth look at crisis resource management principles (such as the review article by Carne et al. (2012) and this dissertation) can be provided as additional reading for those seeking a greater understanding of the concepts. The material should be utilised as a both an online presession material in the days to weeks prior to the intended simulation day, as well as a quick reference guide to use in the minutes prior to the beginning of the simulation as a rapid and effective refresher. Hughes and Hughes (2023) state that pre-briefing can assist in reviewing the sessions goals and objectives whilst creating a psychologically safe space for the learner to feel comfortable. This pre-briefing material is likely to particularly assist junior registrars by providing bite sized information that they can then put into practice in a safe environment.

Post-simulation debriefing

I have chosen to modify the PEARLS model to incorporate the themes discovered in the results section to create a specific tool for non-technical skills for emergency medicine physicians. Like the tool used by Botelho et al. (2022) and continuing with concept of avoidance of information overload, I have chosen to develop a debriefing card, illustrated in Figure 10.

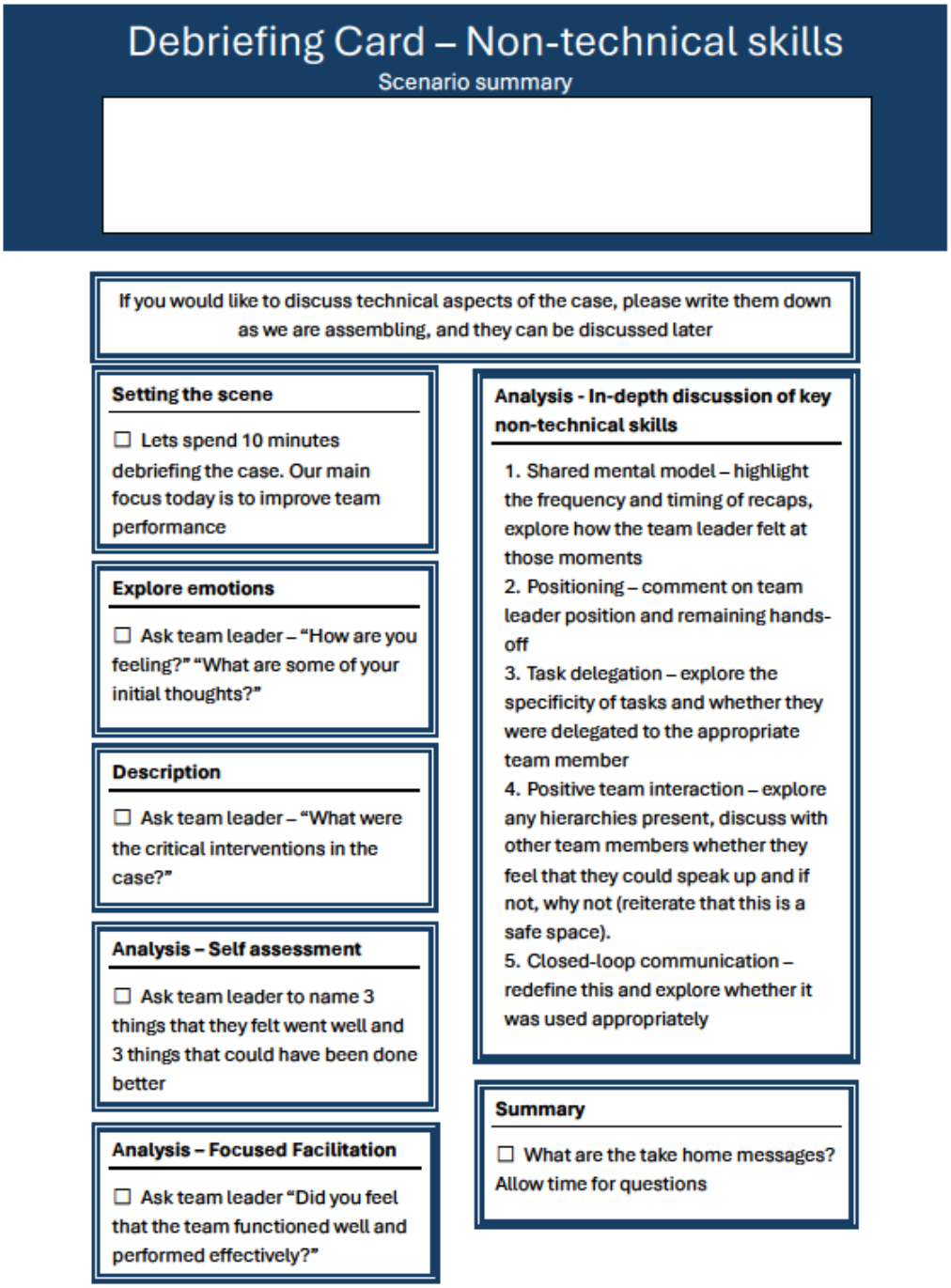

Figure 10. Debriefing card

The concept of a shared mental model was central throughout all of the interviews, interestingly being referred to in several different ways (recap, shared mental model, summary, briefing, huddle, review) and with a variety of different goals. It is obviously central to the way that EP's

utilise CRM principles in resuscitation. Because of its prominence throughout the interview process, it needs to be the dominant concept communicated to registrars in the post simulation debriefing tool. The importance of recapping is supported by Carne et al. (2012) and Salas et al. (2008) with their work on teamwork and shared mental models. Johnsen, Westli, Espevik, Wisborg and Brattebø (2017) also concluded that the team leader plays a central role in generating and updating the shared mental model of the team, a task commonly achieved through the process of frequent recapping. Because of how dominant it was as a theme throughout the interviews, it needs to be at the forefront of the mind of the facilitator whilst observing the simulation and needs to be foremost in the focused facilitation. Providing registrars with the insight that a shared mental model improves team effectiveness (Johnsen et al., 2017) will give them confidence that this skill has an evidence base and will assist them in being an effective team leader. Placing an emphasis on this concept during the debrief will solidify this is a concept for senior registrars, adequately preparing them to lead resuscitation as EP's using the tools identified by other EP's as important for an effective resuscitation.

Maintaining a hands-off approach at the foot of the bed and avoiding becoming task focused, particularly with regard to life-saving procedures in a resuscitation was another prominent theme identified. This is something that could be easily identified by facilitators and from a practical standpoint and lends itself very well to being practiced in simulation. Emergency registrars who have this brought up during debrief will be more likely to position themselves more effectively in the future, preventing task focus and tunnel vision and allowing them to thrive in the team leader role from their optimal position.

Ensuring that task delegation in a resuscitation scenario is specific, targeted to team members able to complete the task and conscious of resources is the third key theme to emerge. In a simulation setting, much as in real time clinical work, team members are not well known to each other and resources are often limited. Identified as a pre-briefing point, discussing the methods

of task delegation and whether or not it was successful in a post simulation debriefing will allow emergency registrars to reflect on the way they delegated tasks and seek to improve that skill in subsequent resuscitations.

Developing positive team interaction has a number of key facets including sharing the cognitive load, allowing team members to speak up and flattening the hierarchy. Many interview participants identified this as not only the key to a successful resuscitation, but also very beneficial for workplace harmony and morale. Focusing on this aspect during the post simulation debrief allows the opportunity not only for emergency registrars to improve their non-technical skills as a resuscitation team leader, but also provides an opportunity for team building and improved workplace relations. Fernandopulle (2021) noted that positive cultures, underpinned by flatter hierarchies, consistently led to higher quality of care.

Closed loop communication was mentioned by almost every interview participant. Encouraging emergency registrars to use this in a pre-briefing tool and then reiterating whether or not it was used effectively is something that facilitators can easily pick up on during a debrief to improve emergency registrars' communication skills. Both the frequency and effectiveness of its use should be mentioned during the debrief.

All of the themes identified are supported by an evidence base within the medical literature as already illustrated. They have subsequently been identified in this study by a group of specialist EP's as having the most importance when it comes to utilisation of crisis resource management principles in a resuscitation. When this expertise is communicated to emergency registrars and reinforced in simulation training, it allows registrars to experience constructive friction, as outline by Vygotsky. The registrars are learning important non-technical skills from experienced senior peers in an environment in which they are challenged and pushed to learn in a psychologically safe environment. This will allow them to develop as effective team leaders in a

resuscitation, enhancing their educational experience from the knowledge gained from the lived experience of their senor clinicians.

Strengths and Limitations

Examining the strengths and limitations of the study, I used interpretive phenomenological analysis which falls under the broader framework of a qualitative study. Using this methodology allowed me to gain a rich understanding of each participants unique experiences and then to integrate those experiences into a set of broader themes shared amongst this relatively heterogenous group. My ethical approval was granted in a timely manner which allowed me the time to recruit a large number of participants and conduct lengthy, in-depth interviews and also allowed me significant time to analyse the data. Whilst reviewing the interview data, I realised that several participants initially focused on the clinical details of the case they were reflecting upon and had to be re-directed to discuss the non-technical aspects in greater detail. Further emphasis on this from the outset may have reduced the burden of data and distilled the themes and messages that I was aiming to extract, creating a more streamlined analysis phase.

The results of the study generally agree with and reinforce existing literature on the topic which provides reassurance about the transferability and reproducibility of the study. In terms of sampling, all participants were known to me and had worked with me previously. In this way, using “acquaintance interviews” allowed familiarity and the development of a good rapport throughout the interviews, which allowed me access to resources that may not have otherwise been available in a more traditional interview style (Garton & Copland, 2010). The fact that interviews were conducted exclusively with FACEM’s and that I am also a FACEM assisted with development of rapport and allowed the interview participants to feel comfortable sharing a common language and feel safe in the knowledge that I could understand and empathise with the stressful and emotive situations that they had experienced, allowing a rich and in-depth interview. All participants were recruited from, trained in and worked in Australia. Whilst the

study is generalisable throughout Australia and will have significant generalisability in other first world western countries, it will not be as generalisable globally due to the specificity of the sample group. All of the thematic analysis was conducted by me as a sole researcher and throughout the analysis process I had to make many subjective judgements about the importance of each statement made, its relevance to the broader study and how to code and group together the data. A different researcher is likely to have a different context to myself and is likely to make different subjective judgements when presented with the same dataset, reducing the repeatability of this study.

Direction for future research

This study is the first of its kind that specifically examines CRM principles through the lens of EP's leading a resuscitation. It has provided a starting point to develop further research and resources within the same field. The next logical step in this area is a pilot study using the pre-briefing and debriefing tools created in this dissertation to determine what effect they can have on the registrar educational experience. Using longitudinal surveys prior to and after 6 months of an SBE program at a single centre to assess the feasibility of incorporating these tools and whether they enhance the educational experience would be an excellent starting point. If feasibility is established, the program then needs to be expanded throughout a health district, followed by a statewide and then a national SBE program to enhance non-technical skills. Once the program reached state and federal levels there would need to be engagement of key stakeholders including the Council Of Education (COE) within ACEM. Expansion to these larger programs would also provide an opportunity to undertake a cost-benefit analysis to determine the priority with which this sits from a budgetary standpoint.

Conclusion

Using a phenomenological approach to explore the lived experience of EP's during resuscitation has allowed me to discover new information about how this group of highly skilled practitioners use CRM principles to successfully lead the resuscitation of an unwell patient. The information gained has taken two key forms. Firstly, specific emergency medicine related content that adds context to the seven principles of crisis resource management, providing support to junior registrars overwhelmed with the concept of non-technical skills. Secondly, five key themes (shared mental model, positioning in the room, task delegation, positive team interaction and closed-loop communication) that provide the more experienced registrar clear goals for how they should team lead a resuscitation from a non-technical point of view, endorsed by emergency specialists in a context that is relatable to emergency medicine registrars in Australia. The in-depth nature of the interviews has also allowed comment on the attitudes that emergency specialists have toward resuscitation and the importance of self-care and avoidance of burnout. In addition to creating new knowledge this research, when published, will bring to the forefront the importance of SBE, non-technical skills and leadership within the ED. These concepts are vital to the future of emergency medicine as a specialty and need to be highlighted regularly in an educational context that relates specifically to emergency medicine registrars and consultants.

References

ACEM. (2023). *FACEM Training Program Curriculum*.

Allen, J., Molloy, E., & McDonald, D. (2020). Severe neurological impairment: a review of the definition. *Dev Med Child Neurol*, *62*(3), 277-282. https://doi.org/10.1111/dmcn.14294

Angus, D. C. (2015). Successful Resuscitation From In-Hospital Cardiac Arrest—What Happens Next? *JAMA*, *314*(12), 1238. https://doi.org/10.1001/jama.2015.11735

ANZCOR. (2024). *Guideline 11.2 – Protocols for Adult Advanced Life Support*.

Arora, M., Asha, S., Chinnappa, J., & Diwan, A. D. (2013). Review article: Burnout in emergency medicine physicians. *Emergency medicine Australasia*, *25*(6), 491-495. https://doi.org/10.1111/1742-6723.12135

Avolio, B. J., Reichard, R. J., Hannah, S. T., Walumbwa, F. O., & Chan, A. (2009). A meta-analytic review of leadership impact research: Experimental and quasi-experimental studies. *The Leadership quarterly*, *20*(5), 764-784. https://doi.org/10.1016/j.leaqua.2009.06.006

Biemel, W., & Spiegelberg, H. (2024). Phenomenology. In *Encyclopedia Britannica*.

Binstadt, E. S., Walls, R. M., White, B. A., Nadel, E. S., Takayesu, J. K., Barker, T. D., Nelson, S. J., & Pozner, C. N. (2007). A comprehensive medical simulation education curriculum for emergency medicine residents. *Annals of emergency medicine*, *49*(4), 495-504. https://doi.org/10.1016/j.annemergmed.2006.08.023

Botelho, F., Yanchar, N., Abib, S., Bank, I., Harley, J. M., & Poenaru, D. (2022). A debriefing tool to acquire non-technical skills in trauma courses. *Surg Open Sci*, *10*, 228-231. https://doi.org/10.1016/j.sopen.2022.10.012

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Breton, E., Kramer, C., Chamberland, C., Dubé, G., Chiniara, G., & Tremblay, S. (2012). The Impact of Communication Training in High Fidelity Simulation of Emergency ICU Resuscitation. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *56*(1), 956-960. https://doi.org/10.1177/1071181312561200

Bromiley, M. (2008). Have you ever made a mistake. *R Coll Anaesth Bull*, *48*, 2442-2445.

Calder, L. A., Mastoras, G., Rahimpour, M., Sohmer, B., Weitzman, B., Cwinn, A. A., Hobin, T., & Parush, A. (2017). Team communication patterns in emergency resuscitation: a mixed methods qualitative analysis. *International journal of emergency medicine*, *10*(1), 1-9. https://doi.org/10.1186/s12245-017-0149-4

Cameron, P. A. (2014). International emergency medicine: Past and future. *Emergency medicine Australasia*, *26*(1), 50-55. https://doi.org/10.1111/1742-6723.12181

Carey, J. M., & Rossler, K. (2023). *The How When Why of High Fidelity Simulation*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK559313/

Carley, S. (2015). Educational theories you must know. Kolb's leanring cycle. St.Emlyn's. https://www.stemlynsblog.org/better-learning/educational-theories-you-must-know-st-emlyns/educational-theories-you-must-know-kolbs-learning-cycle-st-emlyns/.

Carne, B., Kennedy, M., & Gray, T. (2012). Review article: Crisis resource management in emergency medicine. *Emergency medicine Australasia*, *24*(1), 7-13. https://doi.org/10.1111/j.1742-6723.2011.01495.x

Clarke, V., & Braun, V. (2017). Thematic analysis. *The journal of positive psychology*, *12*(3), 297-298. https://doi.org/10.1080/17439760.2016.1262613

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (Eighth edition ed.). Routledge.

Cohen, L., Morrison, K., & Manion, L. (2007). *Research Methods in Education* (Vol. 6th ed) [Book]. Taylor & Francis Routledge. https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,shib&db=nlebk&AN=193801&site=ehost-live&authtype=ip,uid

Cook, D. A., Hatala, R., Brydges, R., Zendejas, B., Szostek, J. H., Wang, A. T., Erwin, P. J., & Hamstra, S. J. (2011). Technology-Enhanced Simulation for Health Professions Education: A Systematic Review and Meta-analysis. *JAMA : the journal of the American Medical Association*, *306*(9), 978-988. https://doi.org/10.1001/jama.2011.1234

Corbetta, L. (2019). Training to competence in interventional pulmonology. *Panminerva Medica*, *61*. https://doi.org/10.23736/S0031-0808.19.03604-8

Creswell, J. W. (2017). *Qualitative inquiry and research design : choosing among five approaches* (Third edition. ed.). SAGE Publications.

Dagnone, J. D., McGraw, R., Howes, D., Messenger, D., Bruder, E., Hall, A., Chaplin, T., Szulewski, A., Kaul, T., & O'Brien, T. (2016). How we developed a comprehensive resuscitation-based simulation curriculum in emergency medicine. https://doi.org/10.3109/0142159X.2014.976187

Dieckmann, P., Molin Friis, S., Lippert, A., & Østergaard, D. (2009). The art and science of debriefing in simulation: Ideal and practice. *Medical teacher*, *31*(7), e287-e294. https://doi.org/10.1080/01421590902866218

Eddles-Hirsch, K. (2015). Phenomenology and educational research. *International Journal of Advanced Research*, *3*(8), 251-260.

El-Shafy, I. A., Delgado, J., Akerman, M., Bullaro, F., Christopherson, N. A. M., & Prince, J. M. (2018). Closed-Loop Communication Improves Task Completion in Pediatric Trauma Resuscitation. *Journal of surgical education*, *75*(1), 58-64. https://doi.org/10.1016/j.jsurg.2017.06.025

Fernandopulle, N. (2021). To what extent does hierarchical leadership affect health care outcomes? *Med J Islam Repub Iran*, *35*, 117. https://doi.org/10.47176/mjiri.35.117

Fioratou, E., Flin, R., & Glavin, R. (2010). No simple fix for fixation errors: cognitive processes and their clinical applications. *Anaesthesia*, *65*(1), 61-69. https://doi.org/https://doi.org/10.1111/j.1365-2044.2009.05994.x

Ford, K., Menchine, M. D. M., Burner, M. E., Arora, M. S., Inaba, M. D. K., Demetriades, M. D. D., & Yersin, P. B. (2016). Leadership and teamwork in trauma and resuscitation. *The western journal of emergency medicine*, *17*(5), 549-556. https://doi.org/10.5811/westjem.2016.7.29812

Forrest, K., & McKimm, J. (2019). *Healthcare simulation at a glance* (1 ed.). Wiley. https://doi.org/10.1002/9781119604020

Frich, J. C., Brewster, A. L., Cherlin, E. J., & Bradley, E. H. (2015). Leadership Development Programs for Physicians: A Systematic Review. *Journal of general internal medicine : JGIM*, *30*(5), 656-674. https://doi.org/10.1007/s11606-014-3141-1

Gaba, D. M., Howard, S. K., Fish, K. J., Smith, B. E., & Sowb, Y. A. (2001). Simulation-Based Training in Anesthesia Crisis Resource Management (ACRM): A Decade of Experience. *Simulation & Gaming*, *32*(2), 175-193. https://doi.org/10.1177/104687810103200206

Gabr, A. K. (2019). The importance of nontechnical skills in leading cardiopulmonary resuscitation teams. *The Journal of the Royal College of Physicians of Edinburgh*, *49*(2), 112-116. https://doi.org/10.4997/JRCPE.2019.205

Galletta, A. (2013). *Mastering the Semi-Structured Interview and Beyond*. New York University Press. https://doi.org/doi:10.18574/nyu/9780814732939.001.0001

Ganotice, F. A., Chan, K. M. K., Chan, S. L., Chan, S. s. C., Fan, K. K. H., Lam, M. P. S., Liu, R. K. W., Wong, G. H. Y., Yuen, G. W. Y., Yuen, J. K., Yeung, S. S. S., Nalipay, M. J. N., Tsoi, F. H. S., & Tipoe, G. L. (2023). Applying motivational framework in medical education: a self-determination theory perspectives. *Medical education online*, *28*(1), 2178873-2178873. https://doi.org/10.1080/10872981.2023.2178873

Garton, S., & Copland, F. (2010). 'I like this interview; I get cakes and cats!': the effect of prior relationships on interview talk. *Qualitative Research*, *10*(5), 533-551. https://doi.org/10.1177/1468794110375231

Grech, M. (2021). The Effect of the Educational Environment on the rate of Burnout among Postgraduate Medical Trainees – A Narrative Literature Review. *Journal of Medical Education and Curricular Development*, *8*, 238212052110187. https://doi.org/10.1177/23821205211018700

Gutierrez, G., Lunsky, I. O., Van Heer, S., Szulewski, A., & Chaplin, T. (2023). Cognitive load theory in action: e-learning modules improve performance in simulation-based education. A pilot study. *Canadian journal of emergency medicine*, *25*(11), 893-901. https://doi.org/10.1007/s43678-023-00586-z

Hammersley, M., & Atkinson, P. (2019). *Ethnography : Principles in Practice* (4th ed.). Routledge. https://doi.org/10.4324/9781315146027

Harper, D. (2011). Choosing a Qualitative Research Method. In (pp. 83-97). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781119973249.ch7

Harper, D., & Thompson, A. R. (2011). *Qualitative Research Methods in Mental Health and Psychotherapy : A Guide for Students and Practitioners*. John Wiley & Sons, Incorporated. http://ebookcentral.proquest.com/lib/oxford/detail.action?docID=818736

Higham, H., & Baxendale, B. (2017). To err is human: use of simulation to enhance training and patient safety in anaesthesia. *British Journal of Anaesthesia*, *119*, i106-i114. https://doi.org/10.1093/bja/aex302

Hosseini, M., Heydari, A., Reihani, H., & Kareshki, H. (2022). Elements of Teamwork in Resuscitation: An Integrative Review. *Bull Emerg Trauma*, *10*(3), 95-102. https://doi.org/10.30476/beat.2021.91963.1291

Hughes, P. G., & Hughes, K. E. (2023). Briefing Prior to Simulation Activity. *StatPearls*. https://www.ncbi.nlm.nih.gov/books/NBK545234/

Hülsheger, U. R., & Schewe, A. F. (2011). On the Costs and Benefits of Emotional Labor: A Meta-Analysis of Three Decades of Research. *Journal of occupational health psychology*, *16*(3), 361-389. https://doi.org/10.1037/a0022876

Hunziker, S., Buehlmann, C., Tschan, F., Balestra, G., Legeret, C., Schumacher, C., Semmer, N. K., Hunziker, P., & Marsch, S. (2010). Brief leadership instructions improve cardiopulmonary resuscitation in a high-fidelity simulation: A randomized controlled trial. *Critical care medicine*, *38*(4), 1086-1091. https://doi.org/10.1097/CCM.0b013e3181cf7383

Johnsen, B., Westli, H., Espevik, R., Wisborg, T., & Brattebø, G. (2017). High-performing trauma teams: frequency of behavioral markers of a shared mental model displayed by team leaders and quality of medical performance. In: BioMed Central.

Kern, P., Tschan, F., Semmer, N. K., & Marsch, S. (2023). Effects of team leaders' position in cardiopulmonary resuscitation teams on leadership behavior and team performance: A prospective randomized interventional cross-over simulation-based trial. *Medicine (Baltimore)*, *102*(27), e34235. https://doi.org/10.1097/md.0000000000034235

Keroack, M. A., Youngberg, B. J., Cerese, J. L., Krsek, C., Prellwitz, L. W., & Trevelyan, E. W. (2007). Organizational factors associated with high performance in quality and safety in academic medical centers. *Academic Medicine*, *82*(12), 1178-1186. https://doi.org/10.1097/ACM.0b013e318159e1ff

Kester-Greene, N., Filipowska, C., Heipel, H., Dashi, G., & Piquette, D. (2021). Learner reflections on a postgraduate emergency medicine simulation curriculum: a qualitative exploration based on focus group interviews. *Canadian journal of emergency medicine*, *23*(3), 374-382. https://doi.org/10.1007/s43678-021-00085-z

Kiger, M. E., & Varpio, L. (2020). Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical teacher*, *42*(8), 846-854. https://doi.org/10.1080/0142159x.2020.1755030

Kimo Takayesu, J., Ramoska, E. A., Clark, T. R., Hansoti, B., Dougherty, J., Freeman, W., Weaver, K. R., Chang, Y., Gross, E., & Yarris, L. (2014). Factors Associated With Burnout During Emergency Medicine Residency. *Academic emergency medicine*, *21*(9), 1031-1035. https://doi.org/10.1111/acem.12464

Kirch, S. A., & Sadofsky, M. J. (2021). Medical Education From a Theory-Practice-Philosophy Perspective. *Acad Pathol*, *8*, 23742895211010236. https://doi.org/10.1177/23742895211010236

Kozulin, A., Gindis, B., Ageyev, V. S., Miller, S. M., Pea, R., Brown, J. S., & Heath, C. (2003). *Vygotsky's Educational Theory in Cultural Context*. Cambridge University Press. http://ebookcentral.proquest.com/lib/oxford/detail.action?docID=218080

Krage, R., Zwaan, L., Tjon Soei Len, L., Kolenbrander, M. W., van Groeningen, D., Loer, S. A., Wagner, C., & Schober, P. (2017). Relationship between non-technical skills and technical performance during cardiopulmonary resuscitation: does stress have an influence? https://doi.org/10.1136/emermed-2016-205754

Krimsky, W. S., Mroz, I. B., McIlwaine, J. K., Surgenor, S. D., Christian, D., Corwin, H. L., Houston, D., Robison, C., & Malayaman, N. (2009). A model for increasing patient safety in the intensive care unit: increasing the implementation rates of proven safety measures. https://doi.org/10.1136/qshc.2007.024844

Lateef, F. (2018). Grace under pressure: Leadership in emergency medicine. *Journal of emergencies, trauma and shock*, *11*(2), 73-79. https://doi.org/10.4103/JETS.JETS_18_18

Lauridsen, K. G., Krogh, K., Müller, S. D., Schmidt, A. S., Nadkarni, V. M., Berg, R. A., Bach, L., Dodt, K. K., Maack, T. C., Møller, D. S., Qvortrup, M., Nielsen, R. P., Højbjerg, R., Kirkegaard, H., & Løfgren, B. (2021). Barriers and facilitators for in-hospital resuscitation: A prospective clinical study. *Resuscitation*, *164*, 70-78. https://doi.org/10.1016/j.resuscitation.2021.05.007

Lopez, K. A., & Willis, D. G. (2004). Descriptive Versus Interpretive Phenomenology: Their Contributions to Nursing Knowledge. *Qualitative Health Research*, *14*(5), 726-735. https://doi.org/10.1177/1049732304263638

Lumivero. (2024). *NVIVO*. In https://lumivero.com/products/nvivo/

Marsch, S. C. U., Müller, C., Marquardt, K., Conrad, G., Tschan, F., & Hunziker, P. R. (2004). Human factors affect the quality of cardiopulmonary resuscitation in simulated cardiac arrests. *Resuscitation*, *60*(1), 51-56. https://doi.org/10.1016/j.resuscitation.2003.08.004

Martín-Brufau, R., Martin-Gorgojo, A., Suso-Ribera, C., Estrada, E., Capriles-Ovalles, M. E., & Romero-Brufau, S. (2020). Emotion regulation strategies, workload conditions, and burnout in healthcare residents. *International journal of environmental research and public health*, *17*(21), 1-12. https://doi.org/10.3390/ijerph17217816

McDermid, F., Peters, K., Jackson, D., & Daly, J. (2014). Conducting qualitative research in the context of pre-existing peer and collegial relationships. *Nurse researcher*, *21*(5), 28-33. https://doi.org/10.7748/nr.21.5.28.e1232

Mundell, W. C., Kennedy, C. C., Szostek, J. H., & Cook, D. A. (2013). Simulation technology for resuscitation training: A systematic review and meta-analysis. *Resuscitation*, *84*(9), 1174-1183. https://doi.org/10.1016/j.resuscitation.2013.04.016

Oxford, U. o. (2022). *Research Ethics Policy*. https://researchsupport.admin.ox.ac.uk/files/policyontheethicalconductofresearchinvolvinghumanparticipantsandpersonaldatapdf

Pardjono, P. (2016). Active Learning: The Dewey, Piaget, Vygotsky, and Constructivist Theory Perspectives. *Jurnal Ilmu Pendidikan (Jakarta)*, *9*(3).

Pedersen, B., Grønkjær, M., & Delmar, C. (2022). Existential phenomenology as a unifying philosophy of science for a mixed method study. https://doi.org/10.1111/nup.12376

Perman, S. M. (2019). Communication in Medical Resuscitation and the Post-Code Debrief. In M. E. Moreira, A. J. French, M. E. Moreira, & A. French (Eds.), *Communication in Emergency Medicine* (pp. 0). Oxford University Press. https://doi.org/10.1093/med/9780190852917.003.0012

Ponterotto, J. G. (2005). Qualitative Research in Counseling Psychology: A Primer on Research Paradigms and Philosophy of Science. *Journal of counseling psychology*, *52*(2), 126-136. https://doi.org/10.1037/0022-0167.52.2.126

Rietmeijer, C. B. T., & Veen, M. (2022). Phenomenological Research in Health Professions Education: Tunneling from Both Ends. *Teaching and Learning in Medicine*, *34*(1), 113-121. https://doi.org/10.1080/10401334.2021.1971989

Rixon, A., Wilson, S., Hussain, S., Terziovski, M., Judkins, S., & White, P. (2020). Leadership challenges of directors of emergency medicine: An Australasian Delphi study. *Emergency medicine Australasia*, *32*(2), 258-266. https://doi.org/10.1111/1742-6723.13402

Rixon, A., Wilson, S., Judkins, S., Bonning, J., Skinner, C., & White, P. (2021). Advancing leadership in Australasian emergency medicine: Taking stock and looking ahead. *Emergency medicine Australasia*, *33*(5), 938-940. https://doi.org/10.1111/1742-6723.13815

Russell, E., Hall, A. K., Hagel, C., Petrosoniak, A., Dagnone, J. D., & Howes, D. (2018). Simulation in Canadian postgraduate emergency medicine training – a national survey. *CJEM*, *20*(1), 132-141. https://doi.org/10.1017/cem.2017.24

Salas, E., Cooke, N. J., & Rosen, M. A. (2008). On Teams, Teamwork, and Team Performance: Discoveries and Developments. *Human factors*, *50*(3), 540-547. https://doi.org/10.1518/001872008X288457

Saldaña, J., & Saldana, J. (2009). *The coding manual for qualitative researchers*. SAGE.

Saunders, B., Kitzinger, J., & Kitzinger, C. (2015). Anonymising interview data: challenges and compromise in practice. *Qual Res*, *15*(5), 616-632. https://doi.org/10.1177/1468794114550439

Saunders, R., Wood, E., Coleman, A., Gullick, K., Graham, R., & Seaman, K. (2021). Emergencies within hospital wards: An observational study of the non-technical skills of medical emergency teams. *Australasian Emergency Care*, *24*(2), 89-95. https://doi.org/https://doi.org/10.1016/j.auec.2020.07.003

Sawatsky, A. P., Ratelle, J. T., & Beckman, T. J. (2019). Qualitative Research Methods in Medical Education. In: Lippincott, Williams & Wilkins.

Sbaffi, L., Walton, J., Blenkinsopp, J., & Walton, G. (2020). Information Overload in Emergency Medicine Physicians: A Multisite Case Study Exploring the Causes, Impact, and Solutions in Four North England National Health Service Trusts. *J Med Internet Res*, *22*(7), e19126. https://doi.org/10.2196/19126

Shabani, K., Khatib, M., & Ebadi, S. (2010). Vygotsky's Zone of Proximal Development: Instructional Implications and Teachers' Professional Development. *English language teaching (Toronto)*, *3*(4), 237. https://doi.org/10.5539/elt.v3n4p237

Sherbino, J., Bandiera, G., & Frank, J. R. (2008). Assessing competence in emergency medicine trainees: an overview of effective methodologies. *Canadian journal of emergency medicine*, *10*(4), 365-371. https://doi.org/10.1017/S1481803500010381

Smith, J. A. (1996). Beyond the divide between cognition and discourse: Using interpretative phenomenological analysis in health psychology. *Psychology & Health*, *11*(2), 261-271. https://doi.org/10.1080/08870449608400256

Strother, C. (2021). *Comprehensive healthcare simulation : emergency medicine* (1st 2021. ed.). Springer. https://doi.org/10.1007/978-3-030-57367-6

Swanwick, T. (2013). *Understanding Medical Education: Evidence, Theory and Practice* (2nd edition. ed.). John Wiley & Sons, Incorporated. https://doi.org/10.1002/9781118472361

Takayesu, J. K., Nadel, E. S., Bhatia, K., & Walls, R. M. (2010). Incorporating simulation into a residency curriculum. *Canadian journal of emergency medicine*, *12*(4), 349-353. https://doi.org/10.1017/S1481803500012458

ten Cate, O., Snell, L., Mann, K., & Vermunt, J. (2004). Orienting Teaching Toward the Learning Process. *Academic Medicine*, *79*(3). https://journals.lww.com/academicmedicine/fulltext/2004/03000/orienting_teaching_toward_the_learning_process.5.aspx

Tools, M. (2024). *What Are Your Values? Deciding What's Important in Life*. https://www.mindtools.com/a5eygum/what-are-your-values

Wilcox, S. R., & Winters, M. E. (2020). Resuscitation in Emergency Medicine: Now More Important than Ever. *Emerg Med Clin North Am*, *38*(4), xvii-xviii. https://doi.org/10.1016/j.emc.2020.07.001

Witheridge, A., Ferns, G., & Scott-Smith, W. (2019). Revisiting Miller's pyramid in medical education: the gap between traditional assessment and diagnostic reasoning. *International journal of medical education*, *10*, 191-192. https://doi.org/10.5116/ijme.5d9b.0c37

Yeung, J. H. Y., Ong, G. J., Davies, R. P., Gao, F., & Perkins, G. D. (2012). Factors affecting team leadership skills and their relationship with quality of cardiopulmonary resuscitation. *Critical care medicine*, *40*(9), 2617-2621. https://doi.org/10.1097/CCM.0b013e3182591fda

Young, J. Q., Van Merrienboer, J., Durning, S., & Ten Cate, O. (2014). Cognitive Load Theory: Implications for medical education: AMEE Guide No. 86. *Medical teacher*, *36*(5), 371-384. https://doi.org/10.3109/0142159X.2014.889290

Zhang, C. (2023). A Literature Study of Medical Simulations for Non-Technical Skills Training in Emergency Medicine: Twenty Years of Progress, an Integrated Research Framework, and Future Research Avenues. *International journal of environmental research and public health*, *20*(5), 4487. https://doi.org/10.3390/ijerph20054487

Zhang, Q., Mu, M. C., He, Y., Cai, Z. L., & Li, Z. C. (2020). Burnout in emergency medicine physicians: A meta-analysis and systematic review. *Medicine (Baltimore)*, *99*(32), E21462. https://doi.org/10.1097/MD.0000000000021462

Appendices

Appendix 1 – Participant information sheet

Using the experience of Specialist emergency physicians in resuscitation situations to inform the educational experiences of emergency registrars in the field of resuscitation-based simulation: A phenomenological study.

PARTICIPANT INFORMATION SHEET

Central University Research Ethics Committee Approval Reference: [EDUC_CIA_23_311]

Introductory paragraph

You are being invited to take part in a research project. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you wish to take part.

Why is this research being conducted?

Resuscitation is the most important skill of any emergency physician in my opinion. Amongst a myriad of key knowledge and skills that stretch across many different areas of medicine, both clinical and non-clinical, it stands clear as a skill that is more important than any other and is unique to the critical care specialties.
Whilst simulation has proved an effective educational tool, I personally also derived a huge benefit from observing and being part of high-quality resuscitative efforts with skilled emergency physicians. A lot of what was gained during those moments was what would be considered part of the hidden curriculum, difficult to quantify and difficult to pass on to others in a specific fashion.
My hope is that by exploring the lived experience of emergency physicians involved in high stakes resuscitation, I can unmask some of the hidden curriculum and provide insight into the key themes and strategies that can help emergency registrars improve their leadership in resuscitation.

Why have I been invited to take part?

As a practising emergency physician, your experiences in leading resuscitative efforts will provide invaluable insight into what non-technical skills are required to successfully resuscitate an unwell patient. You have been identified as someone who's leadership in resuscitation is valued and who is a respected member of the emergency medicine community.

Do I have to take part?

No. It is up to you to decide whether to take part. You can withdraw yourself from the research, without giving a reason, by advising me of this decision. The deadline by which you can withdraw any information you have contributed to the research is 12/09/2024. Any data that has already been collected if you decide to withdraw will be destroyed.

What will happen to me if I take part in the research?

- The interview will take place either in-person or via Microsoft teams depending on your location and availability
- Consent taken will be taken via a written consent form
- The interview should take ~30mins
- Interview questions will be related to a recent resuscitation in which you were the team leader. You will be invited to provide a brief recap and then answer a series of questions designed to explore the lived experience of being a team leader and identify common themes which can be used as educational tools for future emergency registrars.
- With your consent, I would like to audio record you so I can have an accurate record of our conversation.
- You will only be required for a single interview
- You can ask to pause or stop the research activities at any time;

What are the possible disadvantages and risks in taking part?

All the data will be de-identified, alleviating any risks related to confidentiality. Some of the questions will be of a probing nature, but the risks of any major discomfort are minimal.

Are there any benefits in taking part?

While there are no immediate benefits for those people participating in the research, it is hoped that this research will lead to the betterment of registrar education as it pertains to non-technical skills in simulation education.

For all FACEM's, although it is not a requirement, you are able to claim your participation in this interview process towards your Continuing Professional Development (CPD) for the year under the following pathway (Reviewing Performance / Reflection on Professional Outcomes / Survey). For all FRCEM's you should also be able to log this interview as part of your CPD for the year as it is contributing to research and to your professional development.

What information will be collected and why is the collection of this information relevant for achieving the research objectives?

I am interested in your experiences of resuscitation as a team leader and your views regarding aspects of your experience that may benefit those delivering education to emergency registrars. The information you provide will help me better understand key themes and strategies that are common amongst emergency physicians that are team leaders in order to answer my research question on what themes and strategies are of the most benefit when teaching non-technical skills. The interviews will be stored on a secure University server (Nexus 365 OneDrive for Business) for a period of 3 years, as will consent forms.

The researcher and supervisor will have access to the research data.

Will the research be published? Could I be identified from any publications or other research outputs?

The findings from the research will be written up in a dissertation and may be published in academic publications and presented at conference presentations. Participants will not be identifiable in any of these formats

A copy of my dissertation will be deposited both in print and online in the Oxford University Research Archive where it will be publicly available to facilitate its use in future research.

Data Protection

The University of Oxford is the data controller with respect to your personal data, and as such will determine how your personal data is used in the research. The University will process your personal data for the purpose of the research outlined above. Research is a task that is performed in the public interest. Further information about your rights with respect to your personal data is available from the University's Information Compliance web site at https://compliance.admin.ox.ac.uk/individual-rights.

Who has reviewed this research?

This research has received ethics approval from a subcommittee of the University of Oxford Central University Research Ethics Committee. (Ethics reference: EDUC_C1A_23_311**)**.

Who do I contact if I have a concern about the research or I wish to complain?

If you have a concern about any aspect of this research, please contact Dr Michael Fry (Michael.fry@wolfson.ox.ac.uk) or Dr Nicole Dingwall (Nicole.dingwall@education.ox.ac.uk) and we will do our best to answer your query. We will acknowledge your concern within 10 working days and give you an indication of how it will be dealt with. If you remain unhappy or wish to make a formal complaint, please contact the Chair of the Research Ethics Committee at the University of Oxford who will seek to resolve the matter as soon as possible:

The Chair, Social Sciences & Humanities Interdivisional Research Ethics Committee;
Email: ethics@socsci.ox.ac.uk; Address: Research Services, University of Oxford, Boundary Brook House, Churchill Drive, Headington, Oxford OX3 7GB

Further Information and Contact Details

If you would like to discuss the research with someone beforehand (or if you have questions afterwards), please contact:

[redacted]
Department of Education
University of Oxford, 15 Norham Gardens, Oxford OX2 6PY, United Kingdom
University tel: +44 1865 274024
University email: [redacted]

Appendix 2 – Participant consent form

Consent to take part in

"Using the experience of Specialist emergency physicians in resuscitation situations to inform the educational experiences of emergency registrars in the field of resuscitation-based simulation: A phenomenological study."

Central University Research Ethics Committee (CUREC) approval reference: **EDUC_CIA_23_311**

Purpose of Study: To identify key themes and strategies utilised by emergency physicians when leading a resuscitation.

	Please initial each box if you agree with the statement
I confirm that I have read and understand the information sheet for the above research. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
I understand that my participation is voluntary and that I am free to withdraw at any point [until **12/09/2024**], without giving any reason.	
I understand who will have access to personal data provided, how the data will be stored and what will happen to the data at the end of the project.	
I understand that I will not be identifiable from any publications or presentations.	
I consent to being audio recorded.	

Appendix 3 – Interview questions

Indicative questioning

1. Can you state your age and gender?
2. How long have you been a FACEM?
3. Briefly describe the clinical setting you work in
4. When was your most recent resuscitation in which you were team leader and can you take me through the case briefly?
5. How do you rapidly familiarise yourself with your environment?
6. How do you display leadership?
7. What do you do to improve your situational awareness during a resuscitation?
8. How do you anticipate complications/difficulties?
9. What do you do to improve your decision making?
10. What do you do to improve communication? How do you share and review your plan?
11. How do you improve teamwork? How do you distribute the workload?
12. How do you manage multiple tasks simultaneously?
13. Did you notice at any point that your own physiology had changed? E.g tachycardia, diaphoresis, dry mouth,
14. What non-technical skills would be most valuable to teach to registrars engaging in simulations as team leader?
15. Have you ever done a leadership course? Have you ever done any intensive simulation courses?
16. Is your assessment of a successful resuscitation based on the performance of the team or the outcome for the patient?

Appendix 4 – Ethical approval – Curec 1A form

SECTION A: Filter for CUREC 2 application		
This section determines whether the application for ethics review should be made using this form (CUREC 1A) or the CUREC 2 form (for research with more complex ethical issues).		
Please indicate with an 'X'.	**Yes**	**No**
1. Does the research involve the deception of participants?	☐	☒
2. Are the research participants vulnerable in the context of the research, or classed as people whose ability to give free and informed consent is in question? For example, • Participants aged 16 or under (also answer question A5); • Participants aged 16 – 18 who can neither be considered competent youths nor recruited under Approved Procedure 25 • adults at risk; Note the University's Safeguarding Guidance and Code of Practice and its implications for researchers involving young people or adults at risk.	☐	☒
3. By taking part in the research, will participants be at risk of criminal prosecution or significant harm?	☐	☒
4. Does your research raise issues relevant to the Counter-Terrorism and Security Act (the Prevent Duty), which seeks to prevent people from being drawn into terrorism? Best Practice Guidance 07 on the Prevent Duty provides further guidance.	☐	☒
If you answered **'No'** to all the questions above, go to Section B. If you answered **'Yes'** to any question above, continue to question 5 below.		
5. Is your project covered by a CUREC Approved Procedure?	☐	☐
If yes, list the CUREC Approved Procedure(s) you will follow		
If you have answered '**No**' to all questions 1-4, go on to **Section B**. If you answered '**Yes**' to ANY of questions 1-4, and answered '**No**' to question 5, **stop** completing this form and do not submit it for ethical review. You will instead need to submit a CUREC 2 application form. If you answered '**Yes**' to **any** of questions 1-4, and your project is covered by an Approved Procedure, **go on to Section B**. If more than one Approved Procedure applies, contact the SSH IDREC or your DREC for advice on whether a CUREC 2 form should be submitted instead.		

SECTION B: Researchers	
1. Name of Principal Investigator or student's supervisor	
2. Department or Institute	Department of Education
3. University of Oxford email address	
Copy and paste the following six rows as necessary to complete for each additional researcher who will be involved in this study, including student(s) and those external to the University.	
4. Name of researcher or student	

5. Department or Institute	Department of Education		
6. University of Oxford email address			
7. Role in research	Student		
8. Degree programme, if student research	MSc in Medical Education		
The whole research team			
9. Have the researchers undertaken research ethics and integrity training?		**Yes** ☒	**No** ☐
10. Please provide details of any research ethics and integrity training undertaken, including the dates of the training. Alternatively state relevant research experience.	University of Oxford – Research Integrity: Introductory Core Course – Completed 13/10/23		
11. State any conflicts of interest and explain how these will be addressed.	none		

SECTION C: The research project	
1. Title of the research project	
Using the experience of specialist emergency physicians in resuscitation situations to inform the educational experiences of emergency registrars in the field of resuscitation-based simulation: A phenomenological study.	
2. Anticipated start date of the aspect of the research project involving human participants and/ or personal data (**dd/mm/yy**).	**Start once ethics approval attained**
3. Anticipated research end date (**dd/mm/yy**).	30/10/2024
4. Provide a brief lay summary of the aims and objectives of the research. This should cover the questions it will answer and any potential benefits. (max 300 words)	
To identify key themes and strategies utilised by emergency physicians when leading a resuscitation. In identifying key themes, I hope to find information that can inform key aspects of simulation curricula. In identifying strategies, I hope to arm emergency registrars with the tools to effectively lead resuscitation situations.	
5. Please indicate the methods to be used (indicate with an '**X**'):	
Analysis of existing records	☐
Snowball sampling (recruiting through contacts of existing participants)	☐

Use of casual or local workers e.g. interpreters (refer to guidance in BPG 01: Researcher safety)	☐
Participant observation	☐
Covert observation	☐
Observation of specific organisational practices	☐
Participant completes questionnaire in hard copy	☐
Participant completes online questionnaire or other online task (refer to guidance in BPG 06: Internet-mediated research)	☐
Using social media to recruit or interact with participants (refer to guidance in BPG 06: Internet-mediated research)	☐
Participant performs paper and pencil task	☐
Participant performs verbal or aural task (e.g. for linguistic study)	☐
Focus group	☐
Interview (refer to guidance in BPG 10: Conducting research interviews)	☒
Audio recording of participant (you will generally need specific consent from participants for this)	☒
Video recording of participant (you will generally need specific consent from participants for this)	☐
Photography of participant (you will generally need specific consent from participants for this)	☐
Others (please specify below)	☐

6. Provide a brief summary of the research design and methods. What will research participants be asked to do? (max 300 words)
   Please also submit a copy of the questions participants will be asked, if applicable, or some information about the sorts of topics that will be covered.

I plan to use interpretive phenomenology as the methodology for my research study.

I will use semi-structured interviews with a series of pre-planned questions as well as the ability to delve deeper and use my own experience to try and get as much information as possible about my research participants lived experience. For participant selection, I plan to interview exclusively emergency physicians based in either Australia or the UK with either FACEM or FRCEM qualifications. Interviews will take place over Microsoft teams to allow recording of the interview as well as transcription of interview answers. These will hopefully take place between December 2023 and February 2024. I aiming to recruit ~20 participants and hope to recruit a diversity of participants that accurately reflect the diversity of the emergency physician workforce. I will use data saturation to guide the sample size.

I plan to use a modified Van Kaam analysis to analyse the data that I collect. I will use the 7 step process for each individual to get the most out of my data. This analysis will help determine the best way to present the data. This analysis will hopefully take place between

February and May 2024. Following data analysis I will then construct my thesis document in the remaining months leading up to the submission date.			
7. List the location(s) where the research will be conducted, including any other countries.	England, Australia – Predominantly online or face to face		
8. Clarify which parts of the research will be conducted in-person and which will take place remotely, e.g. online.	The decision regarding whether each interview will be online or in-person will be dependent on the availability and location of the participants and will be determined on a case by case basis		
9. If your research involves fieldwork or travel and your department requires a travel risk assessment, will you have completed and returned a risk assessment form beforehand? Please indicate with an '**X**'. (This must be approved by your department before you travel. If you are travelling overseas, you are advised to take out University travel insurance.) Refer to guidance available from your Department, the Safety Office, the Social Sciences Division, and the Humanities Division, and on travel for University business.		Yes	☐
		No	☐
		Not required in this instance	☒
10. In the case of international or collaborative research, explain how you will address any ethical issues specific to the local context. Please provide details of the local review, approval or permission obtained or required. Refer to the BPG 16: Social science research conducted outside the UK and the Code of Conduct for Ethical Fieldwork. If there will be no local review, explain why not. Please mention any stakeholder or community engagement that has been/ will be undertaken in relation to the research. Please also address any physical or psychological risks for Oxford researchers and local fieldworkers in Section G.			
No collaborative research			
11. Name of departmental/ peer reviewer (if applicable)			
12. External organisation funding the research and grant reference (if applicable)			

13. Please refer to the CUREC Best Practice Guidance and list any that have been used to develop your research.	

SECTION D: Recruitment of research participants		
1. Number of participants	20	
2. How was the number of participants decided?	Comparison was made with similar projects and will also be guided by data saturation	
3. Age range of participants	18 and over	
4. Inclusion criteria	Age 18 and over, FACEM or FRCEM qualification, Currently working clinically in an emergency department	
5. Exclusion criteria	nil	
6. Indicate with an '**X**' all intended recruitment methods **Please submit copies of the recruitment material that will be used, e.g. advertisement text, introductory email text.**	Poster advert	☐
	Flyer	☐
	Email circulation	☐
	Social media (e.g. Twitter, Facebook)	☐
	Website	☐
	In-person approach	☒
	Snowball sampling	☐
	Recruitment sites (e.g. Mechanical Turk)	☐
	Existing contacts or volunteer database	☐
	Other (please specify):	☐
7. How will potential participants be identified and approached?	Approaching FACEMs at my current workplaces as well as FRCEM's in my workplace next year.	
8. Will informed consent be obtained from the research participants or their parents/ guardians? If not, please explain why not.	Yes, informed consent will be obtained	
9. For each activity or group of participants, explain how informed consent will be obtained from the participants themselves and/ or their parents/ guardians, if applicable. How will their consent be recorded? **Please submit copies of all participant-facing materials for review.** E.g.: • Recruitment material (e.g. emails, posters)	Participants will be provided with a participant information sheet and then invited to sign a consent form.	

• Information for participants to read (or hear) before they agree to take part (e.g. written information or, if applicable, an outline oral information script). • A document to record informed consent. Further guidance and templates.	
10. Provide details of any payments and incentives and the rationale for providing these. Further guidance in Best Practice Guidance: 05 Payments and incentives in research.	Participants will be informed that participation in the study may allow them to claim their time as continuing professional development for their relevant colleges should they choose.
11. Describe how participants • may withdraw from the study • may withdraw any personal information they have provided from the study State any limits to withdrawal, for example once the data has been anonymised or at some other specified stage prior to publication. Make sure participants are aware of any withdrawal limits.	Participants are able to withdraw from the study at anytime prior to thesis submission (12/09/2024) and have their personal information removed by contacting me and informing of their wish to do so

SECTION E: Research data
All information provided by participants is considered research data for the purpose of this form. Any research data from which participants can be identified is known as personal data; any personal data which is sensitive is considered special category data. Management of personal data, either directly or via a third party, must comply with the requirements of the UK General Data Protection Regulation (UK GDPR) and the Data Protection Act 2018, as set out in the University's Guidance on Data Protection and Research. In answering the questions below, please also consider the points raised in the Data Protection Checklist and Data Protection Screening Assessment and whether, for higher-risk data processing, a separate Data Protection Impact Assessment may also be required for the research. Advice on research data management and security is available from Research Data Oxford and your local IT department. Advice on data protection is available from the Information Compliance team. For guidance on conducting internet-mediated research, refer to CUREC's Best Practice Guidance 06: Internet-mediated research.
1. What data will be collected? (Indicate with an '**X**')

Screening documents	☐	Task results (e.g. questionnaires, diaries)	☐
Consent records (e.g., written consent forms, audio-recorded consent, assent forms)	☒	IP addresses (refer to Best Practice Guidance 09: Data collection, protection and management for guidance)	☐
Contact details for the purpose of this research only	☒	Field notes	☐
Contact details for future use (guidance)	☐	Photographs	☐
Opt-out forms	☐	Information about the health of the participant (including mental health)	☐
Audio recordings	☒	Previously collected (secondary) data	☐
Video recordings	☐	Data already in the public domain. Specify the source of the data:	☐
Transcript of audio/ video recordings	☒	Other, please specify:	☐

2. During the course of the research, where will **each type of** research data be stored?	All data above will be digital and will be collected and then stored on Nexus 365 OneDrive for Business.		
3. Who will have access to the research data during the project?	Participants will not be identifiable from the data and will be given a unique participant number. Myself and my supervisor will be the only people with access to the data		
4. Please complete this section if your research involves the use of secondary (i.e. previously collected) data.	**Please indicated with an 'X'.**	**Yes**	**No**
	Are data access agreements in place for access to and use of this secondary data? (If so, please attach these.)	☐	☐
	Did the individuals agree that their data could be used for this purpose?	☐	☐
	Could anyone (including members of the research team) link the data back to an individual or individuals? If this is a possibility, please explain how the associated ethical issues will be addressed:	☐	☐
	Depositing in a specialist data centre or archive	☐	

5. How do you intend to share the research data at the end of the project?	Submitting to a journal to support a publication	☒
	Depositing in an institutional repository	☒
	Dissemination via a project or institutional website	☒
	No plans to share the data	☐
	Other (please specify):	☐
6. How do you intend to report and disseminate the results of the research? (Indicate with an 'X')	Thesis publication	☒
	Publication in a peer reviewed journal	☒
	Publicly available report	☐
	Conference presentation	☒
	Publication on a website	☐
	Pre-registration	☐
	Report to a research funder	☐
	Providing participants with a lay summary of the results	☐
	Submission for academic assessment	☐
	Other (please specify):	☐
7. Explain what will happen to the data at the end of the research project. This question must be answered for each type of data, including completed consent forms.		
All of the research data (recorded interviews, consent forms) will be safely stored in Nexus 365 OneDrive for business for a period of 3 years. The data will then be destroyed.		

SECTION F: Protection of research participants and their personal data		
1. How identifiable will the participants be from the **research outputs**? (Indicate with an 'X')	Directly identifiable from the information included	☐
	Pseudonymised/ indirectly identifiable	☐
	Not identifiable – data is anonymous	☒
	Other, please specify:	☐
2. To what extent will the **data** be de-identified? How identifiable will any individuals be from the research data? Describe	Interviews will be stored under a unique participant number and will be de-identified. Individuals' voices will be recorded so there is a small possibility that someone familiar with their voice could identify the participant. None of the participants will be known to my supervisor, the only other person who will have access to the data which will be securely stored as mentioned above.	

any measures you will take towards assuring confidentiality, potential risks to confidentiality.	
3. How will you ensure that third parties (e.g., interpreters and transcribers) are aware of and adhere to the measures described in this form?	No third-party involvement

SECTION G: Risks and benefits of the research
1. Will the research involve topics that could be considered sensitive? If so: a. Please provide more detail or supporting information (such as the interview questions) to show the range of questions; b. Explain what steps will be taken to reduce risk of distress; c. Consider seeking advice from within your Department or from the ethics committee including whether the application might benefit from additional ethics review (e.g., via a CUREC 2 application).
The interview questions may trigger memories of a distressing resuscitation. Interviewees will be encouraged to stop at any time if they feel distressed or overwhelmed and can also terminate the interview and withdraw at anytime if they find the material distressing. Given that this will be re-living part of interview participants everyday job, it's unlikely that this will occur but it has been accounted for in the rare event that it does.
2. Describe any additional burden or risks to the participants or others, including the potential for any indirect negative consequences. Explain the steps you will take to address these.
There is no additional burden or risk for participants following the interview
3. Describe any physical or psychological risks to the researcher(s) (including local fieldworkers or research assistants) and the steps you will take to address these.
There are no psychological risks to the interviewer.
4. Describe any benefits of the research, both to participants and to others. Outline the processes put in place to enable equitable research (see BPG 16 Social science research conducted outside the UK for further guidance).

The research will provide insights into the lived experience of emergency specialists during resuscitation, which will allow the education of emergency registrars to be more specific and targeted to things that have helped others in the position they are training ad striving to be in.
5. Comment on the societal impact.
Better trained emergency physicians will deliver better care to patients in the emergency department and has the chance to increase the success of future resuscitations of critically ill patients.
6. Give details of any other ethical issues or relevant information.
NA

SECTION H: Professional guidelines		
Please indicate with an '**X**' at least one set of professional guidelines you will follow.		
Research specialism/ methodology	**Association and guidance**	
Anthropology	Association of Social Anthropologists of the UK	☐
Computer Science	ACM Code of Ethics and Professional Conduct	☐
Criminology	British Society of Criminology Statement of Ethics	☐
Education	British Educational Research Association Ethical Guidelines for Educational Research	☒
Geography	American Association of Geographers Statement on Professional Ethics	☐
History	Oral History Society of the UK Ethical Guidelines	☐
Internet-mediated research	Association of Internet Researchers Ethical Guidelines British Psychological Society: Ethics Guidelines for internet-mediated research Association for Computing Machinery Code of Ethics and Professional Conduct	☐
Management	Academy of Management Code of Ethics	☐
Political Science	American Political Science Association (APSA) Guide to Professional Ethics in Political Science	☐
Politics	Political Studies Association. Guidelines for Good Professional Conduct	☐
Psychology	British Psychological Society Code of Ethics and Conduct	☐
Social research	Social Research Association: Ethical Guidelines	☐
Socio-legal studies	Socio-Legal Studies Association: Statement of Principles of Ethical Research Practice	☐

Sociology	The British Sociological Association: Statement of Ethical Practice	☐
Visual research	ESRC National Centre for Research Methods Review Paper: Visual Ethics: Ethical Issues in Visual Research	☐
Other professional guidelines		☐

SECTION I: Endorsements and signatures
Please ensure this form is endorsed by the Principal Investigator (or student's supervisor), the Head of Department (or nominee) and, if student research, by the student themselves. **The SSH IDREC Secretariat accepts either option below. If you have a DREC, check which signature option it prefers.** • **Option 1: direct email endorsements** Each of the signatories should submit an email from a University of Oxford email address, indicating their acceptance of the responsibilities listed below. • **Option 2: signatures** Please scan the signed form and email it to us as a PDF. Pasted images of signatures cannot be accepted.
Endorsement by the Principal Investigator/ student supervisor and student, if applicable
I/ we the researchers understand my/ our responsibilities as Principal Investigator (and student, if applicable) as outlined in the guidance on the CUREC website. I/ we declare that the answers above accurately describe the research as presently designed, and that the ethics committee will be informed of any changes to the project which affect the answers to this form. I/ we will inform the relevant IDREC if the Principal Investigator changes.

Name of Principal Investigator	
Principal Investigator's signature	
Date	
Name of student (if applicable)	
Student's signature	
Date	16/10/2023

Departmental endorsement – from the Head of Department or nominee
(Another senior member of the department may sign where the head of department is the Principal Investigator, or where the Head of Department has appointed a nominee. Example nominees include Deputy Head of Department, Director of Research, or Director of Graduate/ Undergraduate Studies.)

On the basis of the information available to me, I confirm that: • I am aware of the research proposed and have read this application; • To the best of my knowledge, the proposed design and scientific methodology do not raise ethical concerns; • I support this research in principle, subject to ethical and other necessary reviews.	
Signature	
Name	
Role	
Date	

Appendix 5 – CUREC approval document

SOCIAL SCIENCES & HUMANITIES
INTERDIVISIONAL RESEARCH ETHICS COMMITTEE
DEPARTMENTAL RESEARCH ETHICS COMMITTEE

Department of Education
15 Norham Gardens, Oxford OX2 6PY
student.curec@education.ox.ac.uk; staff.curec@education.ox.ac.uk

[redacted]
Department of Education, Social Sciences Division
University of Oxford

8 December 2023

Dear [redacted],

Research ethics approval Research title: Using the experience of specialist emergency physicians in resuscitation situations to inform the educational experiences of emergency registrars in the field of resuscitation-based simulation: A phenomenological study.

Research ethics reference:
EDUC_C1A_23_311

The above application has been considered on behalf of the Education Departmental Research Ethics Committee (DREC) in accordance with the University's procedures for ethical approval of all research involving human participants.

I am pleased to confirm that, on the basis of the information provided to the DREC, ethics approval has now been granted for this study.

Please note the following:

Personal data: It is the responsibility of the PI to ensure that all personal data collected during the project is managed in accordance with the University's guidance and legal requirements.

In-person activities: Any data collection involving in-person interactions with participants must have an up-to-date fieldwork risk assessment in place; further guidance is available from the Safety Office's website.

Amendments: Please notify the committee if you intend to make any amendments to the information in your ethics application as submitted at date of this approval, as all changes must receive ethical approval prior to implementation. The amendment form is available on the SSH IDREC webpage.

We welcome feedback on your experience of the ethical review process and suggestions for improvement. Please email any comments to staff.curec@education.ox.ac.uk / student.curec@education.ox.ac.uk or ethics@socsci.ox.ac.uk.

Yours sincerely