Healthcare professionals’ experiences of Rapid Response Teams
A meta-synthesis of qualitative research
Abstract

Background
Rapid response teams are now a well-established phenomenon in many hospitals worldwide. Rapid response teams are made up of specially trained health professionals who bring their critical care knowledge and skills to the deteriorating patient’s bedside. The goal is early intervention in an effort to reverse the progression of a patient’s deterioration. Research into rapid response team effectiveness has predominantly taken the form of studies considering quantitative outcome measures. However, the number of qualitative studies is increasing, and these fill an important gap in the research considering healthcare clinicians experiences of facilitators and barriers to successful rapid response team implementation.

Aim
The author’s place of employment, a tertiary-level care hospital, is planning the development and implementation of a rapid response system and rapid response team. With a view to informing this process, the aim of this review was to carry out a meta-synthesis of qualitative research examining healthcare professionals’ experiences of rapid response teams.

Methods
The Joanna Briggs Institutes meta-aggregate approach to qualitative meta-synthesis was utilised in this review. Three online databases were searched: Google Scholar, PubMed, and CINHAL, and 11 articles were found that were eligible for review inclusion.

Results
Two meta-syntheses were developed from results obtained from reviewed articles. Meta-synthesis one described system factors that impacted the success of the rapid response team. Three practice-based recommendations were generated from meta-synthesis one. These include ensuring organisation-wide support for the rapid response system and the development of a culture of safety, ongoing investment in technology and innovation relating to patient deterioration, and enlisting primary medical team support in the development of a rapid response service.
Meta-synthesis two incorporates rapid response team member characteristics and functions that influence the effective implementation and management of the rapid response team. Two practice-based recommendations were developed from meta-synthesis two. These include the importance of rapid response team members having advanced clinical expertise, the ability to work successfully in a team, and effective communication. The rapid response team member functions recommended include bedside teaching and mentoring of ward staff, and the use of proactive rounding to visit at-risk patients and build trust with ward staff.

**Conclusion**
The qualitative studies reviewed in this meta-synthesis were unanimously supportive of rapid response teams. The reviewed studies reinforce available quantitative data, indicating that rapid response teams are an effective patient safety strategy. It is hoped that this review and the practice recommendations in particular will assist in the successful implementation and management of rapid response teams.
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<tr>
<td>ANZICS</td>
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<td>CCOT</td>
<td>Critical Care Outreach Team</td>
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<td>CICM</td>
<td>College of Intensive Care Medicine</td>
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<td>Early Warning Score</td>
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<td>JBI</td>
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<td>MET</td>
<td>Medical Emergency Team</td>
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<td>NZEWS</td>
<td>New Zealand Early Warning Score</td>
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<td>PAR</td>
<td>Patient At Risk</td>
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<td>RCT</td>
<td>Randomised Controlled Trials</td>
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<td>RRS</td>
<td>Rapid Response System</td>
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Chapter 1. Introduction & Background

Introduction

Rapid Response Teams (RRTs) are now a well-established phenomenon in many hospitals worldwide (Cziraki et al., 2008; Duncan, Wells, & Pearson, 2017; Jones & Bellomo, 2017a). With an increasing focus on patient safety, and the recognition that many deteriorating ward patients had been going unnoticed, RRTs have become the approach of choice in responding to clinical deterioration. RRTs are made up of specially trained health professionals who bring their critical care knowledge and skills to the patient’s bedside. The goal is early intervention in an effort to reverse patient deterioration or the implementation of appropriate end-of-life care.

Research into RRT effectiveness has predominantly taken the form of quantitative studies looking at outcome measures such as ICU admissions, hospital cardiac arrests and mortality rates. While quantitative research increasingly indicates that RRTs are effective for addressing patient deterioration, disparity in the literature remains highlighting the fact that some hospital RRTs are more effective than others. Multiple variables exist between hospitals where quantitative RRT studies have been conducted, and there is a growing awareness among healthcare clinicians, that these variables may have a major impact on RRT success. A number of qualitative studies have now been conducted addressing this question. The purpose of this review is to look at this research to determine the factors that influence the effective implementation and management of RRTs within acute care hospitals.

The impetus for completing this review stems from a New Zealand Health Quality & Safety Commission programme to implement a nationwide Rapid Response System (RRS) (Health Quality & Safety, 2016b). The author’s place of employment is in the Intensive Care Unit (ICU) of a tertiary-level-care hospital that is currently working toward implementing the directives of this commission. Given that ICUs experience the effects of acutely deteriorating patients on a daily basis, ICU staff have a vested
interest in the development and implementation of RRSs. Thus, it is due to this interest that it was decided to consult the research to inform the development and successful management of a RRT within our hospital.

The review begins in chapter one by introducing RRTs, and provides a background to their implementation in New Zealand. Chapter two details the methodology used in this review. It includes a discussion on evidence based practice and qualitative evidence synthesis, and details the process of qualitative meta-synthesis utilised in this review. Chapter three reports the findings derived from the chosen articles, including the themes that emerged during data synthesis. Chapter four then provides an in-depth discussion of these resulting themes with reference to relevant current literature. Chapter five concludes this review with implications for practice, recommendations for future research, and limitations of the review.

**Background**

This section begins by describing the various terms used for in-hospital response teams. Next, RRSs - the organisational system which RRTs form part of - is discussed. Different models of RRT and the current evidence for and against RRTs are then explored. The chapter continues by looking at RRTs within the New Zealand context, before concluding with the relevance of this review for the author.

**Response Team Labels**

Both within the literature, and in the healthcare environment, response teams have been given many labels. In the United Kingdom, response teams are predominantly called Critical Care Outreach Teams (CCOTs) (Kause et al., 2004; Cretikos & Bellomo, 2006; Baker-McClearn, & Carmel, 2008). In the United States of America, they tend to be called RRTs (Berwick, Calkins, McCannon, & Hackbarth, 2006; Thomas, Force, Rasmussen, Dodd, & Whildin, 2007), while in Australia and New Zealand, the term Medical Emergency Team (MET) is most common (Currey, Allen, Jones 2018; ANZICS-CORE MET dose Investigators, 2012). Within New Zealand hospitals, however, CCOTs and Patient at Risk Teams (PART) are becoming

What all of these labels have in common, is that they describe a similar phenomenon: teams with critical care expertise that respond in a timely fashion to patient deterioration on hospital wards. An academic consensus is beginning to emerge on which term should be used when referring to the unique composition of deteriorating patient response teams. The following descriptions are collated from these sources: Winters & DeVita, 2017; Wood et al., 2017; & Wailing & Psirides, 2006:

- **Critical Care Outreach Team (CCOT):**
  Predominantly ICU based, often nurse-led teams that review discharged ICU patients, respond to deteriorating ward patients, and support and educate ward staff. These teams respond to lower threshold Early Warning Score (EWS) activations, and may work in conjunction with an ICU physician-led MET for higher threshold EWS triggers.

- **Patient at Risk Team (PART):**
  A nurse-led team which is very similar to CCOTs. It is made up of critical care experienced staff (not only ICU), who attend ward referrals, respond to lower threshold EWS triggers, and provide a resource for ward staff. PARTs may also work in conjunction with an ICU based MET.

- **Medical Emergency Team (MET):**
  A physician led deteriorating patient response team usually run out of the ICU. These are often multidisciplinary in nature including nurses and other allied health professionals. MET calls may involve both MET physicians and CCOT or PART nurses. METs are capable of the full range of assessment, diagnosis, treatment, and planning for the deteriorating patient.

- **Rapid Response Team (RRT):**
  A catchall term that generally reflects a MET type response team, however, they may be either physician-led or nurse-led. They can provide a high level of assessment, treatment and stabilisation. If RRTs are nurse-led, they generally have physician consultation available.
This understanding, however, is far from universal. It is common for local names of programmes not to be reflective of the definitions described above. For example, while METs are predominantly the term applied to physician-led response teams, CCOTs have also been reported as being physician-led (Winters & DeVita, 2017). Additionally, often these labels are used interchangeably. In both Australia and the United States, for example, the terms RRT and MET are often used in reference to the same team (Winters & DeVita, 2017; Jamieson, Ferrell, & Rutledge, 2008).

With these difficulties in mind, and in the interest of clarity and simplicity, this dissertation will use the term Rapid Response Team (RRT) to describe the generic deteriorating patient response team.

**Rapid Response Systems**

RRTs represent the response arm of the larger quality and safety initiative, Rapid Response Systems (RRSs). RRSs have been defined as “the entire system for responding to all patients with a critical medical problem” (Winters, & DeVita, 2017, p. 20). The response arm of the RRS differs among hospitals but may include both RRTs that attend to patient deterioration and a cardiac arrest or code team that provides care to those at the point of arrest. A commonality in the RRSs is that the overall aim is to prevent patient deterioration through the early recognition and response to deteriorating patients on hospital wards. Thus, RRSs represent a systematic change in the way hospitals provide care (DeVita & Bellomo, 2007). They involve bridging the siloed team-based model of care, and ensuring that critical care knowledge and expertise is available to all patients irrespective of the team they are admitted under.

RRSs find their origin in the early 1990’s when critical care clinicians developed a growing awareness of a gap in service delivery. At the time, clinicians recognised that “hospitals [were] not as safe as they could be” (Cretikos & Bellomo, 2006, p. 104). The deterioration of many patients was going unidentified or untreated until they suffered a critical event such as a cardio-respiratory arrest. Specialists began to
question what was happening to these patients in the time prior to arrest, and whether anything could be done to prevent this deterioration.

Research conducted at the time supported what clinicians were seeing anecdotally: critical events such as cardiac arrests were rarely sudden, and in the hours prior to cardiac or respiratory arrest, both haemodynamic or respiratory instability were observable in simple patient vital signs. A landmark study conducted in the late 1980’s considering clinical antecedents preceding in-hospital cardiac arrest, reported that in the eight hours prior to arrest, 84% of patients had a recorded deterioration (Schein, Hazday, Pena, Ruben, & Sprung, 1990).

Similar findings have been reported in many studies since. Buist et al. (1999) found that patients experiencing critical events in hospital had a median of 6.5 hours of instability seen in physical observations or laboratory test results. In a later study, Hillman et al. (2002) found that 60% of patients who transferred acutely from wards to ICUs were documented as showing deteriorating vital signs in the eight hours prior to admission. Similarly, the ACADEMIA study which included hospitals from the United Kingdom, Australia and New Zealand, reported that serious physiological abnormalities were documented in 60% of cases preceding cardiac arrest, death, or unexpected ICU admission (Kause et al., 2004). Of particular concern was the finding that while abnormal vital signs were documented for over 24 hours prior to a critical event, in some cases there was no evidence of escalation of concern.

The research was definitive: deteriorating patients often had a treatable physiological deterioration in the hours prior to cardiac or respiratory arrest. Thus, it was postulated that early intervention during this critical period of deterioration could lead to improved patient safety and an increase in the number of lives saved (Winters & DeVita, 2017). To address this need for early intervention, in-hospital RRSs have now been implemented in many hospitals worldwide. Their goal is to improve the recognition of deteriorating patients on general wards, and to provide early interventional care, thereby reducing the incidence of cardio-respiratory arrest and hospital mortality (Winters et al., 2013).
RRSs have a two-fold responsibility: firstly, they must recognise patient deterioration, and secondly, they must respond to that deterioration. These two aspects of RRSs are known as the afferent and efferent limbs. The afferent limb describes systems that are designed to monitor the patient, recognise deterioration, and trigger a response (Smith, Prytherch, & Psirides, 2017). Recognition of deterioration commonly involves Early Warning Scoring (EWS) of vital signs such as heart rate or blood pressure, and abnormal clinical observations such as level of consciousness or airway obstruction (Hillman & Chen, 2014). Increasingly, patient or family triggering of the RRT is being incorporated into RRSs. This involves enabling both patients and their family’s to directly call the RRT registering their concern, and asking for a patient review (Gill, Leslie, & Marshall, 2016; Wailing & Psirides, 2016). Since no response can follow unless patient deterioration is recognised and escalated, the afferent limb has been described as “one of the most important components” of a RRS (Rao & DeVita, 2017, p. 26).

The efferent limb of the RRS involves the response to the deteriorating patient. It is this limb that this review will focus on. The nature and composition of this efferent limb response varies widely between hospitals (Hillman & Chen, 2014). However, the concept is the same: getting clinicians to the bedside with the expertise to address a patient’s deterioration.

**Rapid Response Teams**

RRTs represent the key component in the efferent arm of the RRS. They are composed of health professionals with critical care expertise who respond and attend to patient deterioration on hospital wards. In many hospitals worldwide, RRTs have become the patient safety response strategy of choice to reduce cardio-respiratory arrests, ICU admissions, and patient deaths (Cziraki et al., 2008).

**Rapid Response Team Models**

Guidance from the literature regarding the best composition of RRTs remains elusive. A variety of models of RRTs are currently being used around the world (ANZICS-CORE MET dose Investigators, 2012; Pedersen et al., 2014) (see *Response Team*...
Team composition generally evolves locally, depending on factors such as hospital size and culture; the availability of critical care services; and patient case-mix and acuity (Health Quality & Safety Commission, 2017; Jones & Bellomo, 2017a). Commonly, RRTs are either led by physicians, or led by nurses. While multiple studies have considered the effectiveness of RRTs, there remains no firm evidence indicating the efficacy of one model over another. This may in part be due to the difficulty of comparing different teams. While metric data relating to the effectiveness of RRTs could be compared between hospitals, potential organisational and situational variables related to team implementation may make direct comparison problematic. That being said, the literature does provide some direction relevant to RRT composition.

A number of recent systematic reviews and meta-analyses show that team composition (whether physician or nurse led) has no apparent impact on hospital mortality, or in-hospital cardio-respiratory arrest rates (Solomon, Corwin, Barclay, Quddusi, & Dannenberg, 2016; Maharaj, Raffaele, & Wendon, 2015). In a before-and-after study conducted in New Zealand, the effectiveness of a PAR team made up primarily of ward-based (non ICU) nurses was investigated (Pirret, Takerei, & Kazula, 2014). The introduction of the PAR team was associated with a reduction in the number of cardiac arrests, ICU admissions and hospital length of stay. The authors note, however, that the large tertiary level hospital where the study was conducted concurrently had an established MET, a Surgical Emergency Team, and a Paediatric Emergency Team. Thus, the level of attention given to patient deterioration within the organisation prior to PAR team implementation was high. If anything, this makes the PAR team’s results all the more impressive. Other advantages of nurse-led teams include the fact that they may be less intimidating to ward staff, resulting in earlier escalation (Duncan et al., 2017), and that ward nurses may be “more receptive to feedback and education from nursing colleagues” (Health Quality & Safety Commission, 2016a p. 14). Additionally, there is an obvious financial benefit from using nurse-only rather than physician-led teams.

In contrast, a review published in 2009 suggested that physician-led response teams were associated with better patient outcomes (Jones, Bellomo, & DeVita, 2009). Observing that most of their reviewed studies demonstrating RRT effectiveness
included a physician-led team, the authors posit that a response team without an appropriately trained medical presence “may significantly decrease the likelihood of a positive outcome” (Jones et al., 2009, p. 313). The reviewers suggested that this was related to a physician’s ability to provide more complex interventions and to expedite transfer to a higher level of care when needed. Physician-led teams may also have the advantage of being more used to coordinating end-of-life discussions (Jones & Bellomo, 2017b), although nurse involvement in this role also occurs in some hospitals (A. Pirret, personal communication, June 18th 2018). A recent systematic review considering the role of the MET in introducing limitations of care concluded that up to 30% of MET calls involve end-of-life discussions (Tan & Delaney, 2014). While the ability to consider the appropriateness of continued active treatment may be in the best interests of the patient, it has the added organisation benefit of reducing inappropriate ICU admissions.

A lack of both financial and ICU resource has led some hospitals to implement primary team based models where only a patient’s primary medical team respond to their clinical deterioration. Howell et al. (2012) conducted an interrupted time series analysis with the aim of determining whether a RRS utilising only ward-based care providers was as effective as using an external RRT. They found that using this model led to an 80% reduction in unexpected mortality. However, there was no significant reduction in overall in-hospital mortality (Howell et al., 2012). In the same year, Morris et al. (2012) published a study that compared the differences in outcomes between an ICU-led MET, and a ward based physician-led MET. The hospital in which the study was conducted was uniquely suitable for this type of study, as an ICU physician attended MET calls during the day, and after hours, a senior ward-based physician covered this role. This retrospective study covered four years with a total of 139,182 patient admissions and 1,404 MET activations. They found that there was no significant difference in cardio-respiratory arrests or hospital mortality rates between the ICU and ward-based physician models. However, the researchers make a point of noting that the lack of significant difference may be attributed to the consistency and experience of the nursing staff, who also were members of the MET (Morris et al., 2012). Thus, while the physician lead changed in this study, skilled MET nursing staff maintained uniformity of care provision during both the day and night shifts.
The appeal of using a primary medical team approach lies in the fact that this model may require no additional staffing, which is significant given that RRT staffing comes at a considerable cost. In addition, there is also an awareness amongst clinicians that the implementation of a RRT is only required due to the failure of conventional systems to adequately address patient deterioration (White, Scott, Vaux, & Sullivan, 2015; Winters et al., 2013). If ward-based teams managed the clinical deterioration of patients appropriately, there would be no need for a RRT (Litvak & Pronovost, 2010). However, as can be seen in the literature, the continued need for such teams is illustrated by the improved outcomes RRT implementation facilitates. Winters et al. (2013) concludes that until the “culture and system deficits that contribute to the root of the problem…[are addressed]...RRSs seem to be the best option” (p. 423).

Thus, significant questions remain as to the best model and composition for RRTs. The old adage that ‘one size fits all’ certainly does not apply here. Many factors require consideration when developing a response team model. However, one thing that is clear from the literature is the importance of keeping an open mind, and not regarding a particular model as the only valid method of response to patient deterioration.

**RRT Evidence**

Research into RRT effectiveness generally focuses on three outcome measures: cardio-respiratory arrest rates, unexpected ICU admissions, and incidence of hospital mortality. While the literature contains studies that reported no significant benefit from RRT implementation, multiple studies have shown the opposite.

A 2010 systematic review and meta-analysis of RRT implementation analysed 18 studies that were conducted between the years 2000 and 2008 (Chan, Jain, Nallmothu, Berg, & Sasson, 2010). The primary outcome measure investigated was hospital mortality, and in this study the researchers found no significant reduction in adult in-hospital mortality following the implementation of an RRT. However, the authors’ note that it is possible their sample size was too small to detect a significant reduction in mortality. A 21.4% reduction in paediatric mortality was reported, but this finding was found not to be robust to sensitivity analysis. Cardio-respiratory arrest rates were
examined as a secondary outcome measure. In this measure the implementation of a
RRT was associated with a 33.8% reduction for adults, and 37.7% for children.

Since 2010, there appear to have been four further systematic reviews and meta-
analyses conducted on RRS implementation (Winters et al., 2013; Sandroni,
D’Arrigo, & Antonelli, 2015; Maharaj, Raffaele, & Wendon, 2015; Solomon et al.,
2016). There is significant similarity between the studies included in these four
reviews, and thus, it is not surprising that their results are comparable. The most
recent of these meta-analyses was conducted by Solomon and colleagues, and was
published in 2016. Their review of 22 studies included 13 that were conducted since
Chan et al.’s (2010) review. They concluded that RRTs significantly reduce out-of-
ICU cardio-respiratory arrests (38% - R.R. = 0.62), and hospital mortality (12% -
R.R. = 0.88) (Solomon et al., 2016). Similar results are reflected in the other reviews
listed above.

One of the difficulties in using this research to inform practice direction, is that the
vast majority of research conducted into RRTs involves before-and-after studies, the
quality of which is generally considered to be low to moderate (Winters, 2017), and
prone to bias (Sandroni et al., 2015). In health research, the preferred approach would
generally be Randomised Controlled Trials (RCTs). However, as will be appreciated,
there are significant logistical and ethical difficulties involved in randomising
deteriorating patients into either treatment or non-treatment groups. To date, only two
RCTs have been conducted. The first was by Priestly et al. (2004) who used a ward-
cluster randomised design in a single institution study. The 800-bed hospital had 16
study wards which all began as control wards. As ward staff were educated, wards
transitioned to the intervention arm of the study. The study lasted for 32 weeks, after
which all wards had become part of the intervention arm. The researchers found a
statistically significant reduction in hospital mortality (48% - O.R. = 0.52). However
the authors note significant weaknesses in their study including their inability to blind
the control and intervention groups; the potential for the ‘Hawthorne effect’ since
staff knew they were in either the control or intervention group; and the fact that their
study was underpowered by only using one hospital (Priestly et al., 2004).
The second RCT sought to address some of these weaknesses by randomising multiple hospitals into either the control or intervention arm. The MERIT study is the only large-scale multi-centre cluster RCT of METs that has been conducted. The researchers included 23 Australian hospitals that were randomly assigned to either function as usual with no MET, or to introduce a MET. The MERIT researchers found no statistically significant difference between the control and intervention hospitals relating to the incidence of cardiac arrests, unplanned ICU admissions, and deaths (Hillman et al., 2005). However, the MERIT study has been widely criticised for many reasons including its short duration (six months), its lack of blinding, and the lack of power in the cluster-randomised design (Ludikhuize et al., 2015; Winters, 2017). The researchers also note that there was evidence from some of the control hospitals that existing cardiac arrest teams were, to some extent, already operating as METs. Thus, the true benefit of response team implementation may have been under reported. In discussing some of the problems inherent in RRT randomisation, one reviewer estimated that more than 100 institutions would have to be randomised to give a study sufficient power to detect a 30% effect, and this would require a study period of at least three years (DeVita & Bellomo, 2007). Thus, robust before-and-after studies may represent the most appropriate way to examine the effectiveness of RRTs.

A number of before-and-after studies stand out in the literature. A recent nationwide study of 12 Dutch hospitals, the largest trial to ever be conducted on RRTs, found RRTs significantly reduced severe adverse events (Ludikhuize et al., 2015). The researchers’ outcome measures were the number of patients per 1,000 admissions with cardio-respiratory arrest, unplanned ICU admission, or death. The study sample size was significant included 166,569 patients covering 1,031,172 hospital admission days. Overall, there was a reduction in the number of such events by 15% (O.R. = 0.847) following RRT implementation. Individual outcome measures also showed significant reductions: cardio-respiratory arrests reduced by 39% (O.R. = 0.607); ICU admissions by 12% (O.R. = 0.878); and hospital mortality by 20% (O.R. = 0.802).

Furthermore, Chen and colleagues (2014) conducted another notable large multi-hospital study. Using a comparative and before-and-after design, they compared one hospital with an established RRS with three hospitals without RRSs. Subsequently, two of the control hospitals also introduced a RRS, and this provided further before-
and-after data for analysis. The study period covered approximately eight years and included over 1,500,000 patient admissions. Compared to the three hospitals with no RRSs, the hospital with a RRS showed a reduction of 52% in the number of in-hospital cardiac arrests (R.R. = 0.48), and a reduction of 6% in the cases of in-hospital mortality (R.R. = 0.94). Following the two control hospitals implementing a RRS, there was a 22% reduction in in-hospital cardiac arrest rates (R.R. = 0.78), and an 11% reduction in hospital mortality (R.R. 0.89).

Thus, despite the mixed picture presented in the literature, the number of studies illustrating the effectiveness of RRTs is both significant and increasing in number. RRTs are now well entrenched as a patient safety initiative in their own right, and they show no sign of disappearing.

The effectiveness of RRTs is not limited to only quantifiable outcomes. Studies that investigate the standard outcome measures already described may not account for other important influences on the success of RRTs. Multiple factors are now recognised as influencing the successful implementation of a RRT. These include things such as hospital culture and hierarchy; RRT staffing models; staff education strategies; failure to escalate; level of governance and managerial support; intra and inter-professional collaboration; and communication (Jenkins & Lindsey, 2010; Murray, & Kleinpell, 2006; Davies, DeVita, & Hillman, 2017). This heterogeneity of factors affecting RRT success may not be accounted for in quantitative studies, which makes comparison of these studies problematic. This disparity may also explain why some RRT studies have produced mixed results.

There is a growing body of qualitative research investigating these factors by examining healthcare professional’s experiences of RRTs. The aim of this research is to discover the difficulties and challenges clinicians face as they implement and use RRTs. This knowledge may then be used to better understand factors influencing effective implementation and successful management of RRTs within different healthcare settings. To date, there does not appear to have been any published meta-synthesis of qualitative evidence relating to healthcare professionals experiences of RRTs. Yet qualitative research may provide valuable instruction related to effective
RRT implementation, describing the real experience of RRTs by clinicians on the ground.

**Rapid Response Systems in New Zealand**

In New Zealand, providing prompt and appropriate care for deteriorating patients has been identified as a key priority in reducing risk and improving patient safety in our hospitals (Moore & Poynton, 2015). Compared to many other western countries, New Zealand hospitals have been relatively slow in adopting RRSs. Those New Zealand hospitals that do have response systems have evolved their system locally, so that there is significant variation in both recognition and response systems throughout the country (Health Quality & Safety Commission, 2017).

In 2014, the Health Quality & Safety Commission (HQSC) sought health sector input on future themes for their ‘open for better care campaign’. Patient deterioration emerged as a priority (Health Quality & Safety Commission, 2016b). At the time, it was recognised that within the New Zealand health system, “clinical deterioration [was] not being consistently identified or responded to, leading to preventable harm or inappropriate care” (Moore & Poynton, 2015, p. vi).

In late 2014, the Sapere Research Group was commissioned with developing an investment case for a national deteriorating patient quality improvement programme. Their report was published in April 2015, and it noted the fragmented nature of the response to patient deterioration at that time (Moore & Poynton, 2015). The group based this finding in part on a study conducted in 2012, which found that although all 20 of the New Zealand District Health Boards (DHBs) were using Early Warning Scoring (EWS) systems, there was large variation in the criteria they used (Psirides, Hill, & Hurford, 2013). Their recommendations to the Commission involved both implementing a national standardised EWS, as well as promoting the implementation of response teams (Moore & Poynton, 2015).

Following this report, the HQSC embarked on a programme of reviewing evidence for the benefits of RRSs, as well as a scoping exercise of the then current New Zealand hospital processes for addressing patient deterioration (Health Quality &
Following this process, on the 13th of April 2016, the HQSC officially approved the development of a New Zealand patient deterioration quality improvement programme. The aim of this programme is to “reduce harm from failures to recognise and respond to acute physical deterioration for adult inpatients (excluding maternity) by July 2021” (Health Quality & Safety, 2016b, p. 5).

The first work-stream for this strategy involves DHBs implementing a RRS that includes a nationally standardised New Zealand Early Warning Score (NZEWS) vital signs chart and a localised escalation pathway. The second and third work-streams respectively include adapting the RRS to allow patients, family and whānau the ability to escalate concern; and the introduction of a ‘goals of treatment’ discussion, where patients admitted to hospital will be able to identify their care preferences in the event of acute deterioration (Health Quality & Safety, 2016b). Two years into the Commission’s project, the first work-stream is moving toward completion. Many DHBs have already piloted and implemented the NZEWS. Those that have not yet done this are to have the NZEWS adopted and implemented by 2018 (Health Quality & Safety, 2016b).

Implicit in the implementation of the NZEWS is the development of an escalation pathway. Due to variations in hospital size, and the availability of critical care resource personnel throughout the country, the HQSC has not mandated the form they expect a hospital’s response to escalation to take. This decision has been left to the discretion of individual hospitals that best understand their patient population and the critical care expertise available (Health Quality & Safety, 2017).

However, the Sapere Report provides some guidance in this regard. In defining the expectations regarding patient deterioration, it states that irrespective of which hospital a patient is admitted to in New Zealand, the response should be the same: appropriate and timely treatment (Moore & Poynton, 2015). It proposes that for large New Zealand hospitals, the response team would likely be available to attend patients who deteriorate 24 hours a day, seven days a week. For smaller New Zealand hospitals, however, one person covering response team activations during the day may be appropriate, “with 24-hour virtual support from a larger hospital” (Moore & Poynton, 2015, p. 29).
Rapid Response Teams (RRTs) have a long, yet lonely, history within the New Zealand health system. The first New Zealand hospital RRT was established in 1995, but it was another 10 years before a second hospital implemented a team (Pedersen et al., 2014). A landmark 2007 Health and Disability Commissioner investigation into the death of a patient in a tertiary level hospital in New Zealand provided the impetus for many hospitals to implement RRTs. Such was the seriousness of breaches in patient care in this case, that, for the first time ever, the Commissioner referred the involved DHB to the Human Rights Review Tribunal to face a potential civil claim (Health & Disability Commissioner, 2007b). In their findings, the Commissioner endorsed an independent expert’s advice “that [the DHB needed] to invest in some form of Medical Emergency Team or ICU outreach to identify and manage the physiologically unstable patient on general medical and surgical wards” (Health & Disability Commissioner, 2007a, p. 104).

Initially, this watershed decision led to an increase in the number of New Zealand acute care hospitals implementing RRTs: from three in 2007 to six in 2008 (Pedersen et al., 2014). However, by 2014 only nine of the twenty acute care hospitals had formal RRTs (Pedersen et al., 2014). The most common reasons for this included hospitals having limited financial resources or the lack of a perceived need to set up a response team (Pedersen et al., 2014).

Currently (in 2018), of the five tertiary level hospitals in New Zealand, the author’s place of employment is the only tertiary hospital that does not have a RRT. The implementation of the New Zealand national patient deterioration programme has necessitated a review of this hospital’s management of clinical deterioration. At present patient deterioration is managed by a patient’s primary medical team. Primary medical teams may request an ICU review if they are struggling with the management of deteriorating ward patients. This involves either an ICU registrar or consultant attending the patient on the ward and making decisions regarding the on-going provision of care. This service has never been formalised, and as such, removes core ICU medical staff whose primary role is in providing care for current ICU patients.
Additionally, in the past, ICU nursing staff also provided an informal Critical Care Outreach service. This involved reviewing complex patients following their transfer out of the ICU. ICU nursing staff also responded to requests for assistance from ward nurses when resource allowed. However, in the past five years, an increase in ICU bed numbers has meant that the ICU nursing resource has become increasingly stretched, so this informal service has ceased.

In January 2018, a Critical Care Steering Committee was formed to consider the development of our local response to deteriorating patients. This coincides with the implementation of the NZEWS. The author is one of the members of this committee. While the form of our local response is yet to be determined, evidence for the effectiveness and efficacy of RRTs seems clear. Quantitative research indicates that the implementation of a team will likely decrease out-of-ICU cardio-respiratory rates, unexpected ICU admissions, and overall hospital mortality.

The principle is certain: the question is one of successful design, implementation and management. What are the factors that influence the effective implementation and ongoing management of a RRT in our hospital? The answer in part lies in the experiences of the healthcare personnel who work with RRTs. It is the aim of this review to explore these experiences.

**Summary**

RRTs represent the efferent limb of the Rapid Response System – an organisational safety net designed to recognise and respond to patient deterioration in acute care hospitals. RRTs are made up of expert clinicians who bring their critical care knowledge and skills to the patient’s bedside. The goal is early intervention in an effort to reverse patient deterioration. RRTs are increasingly being found in hospitals across the world in recognition of the fact that the deterioration of many patients is neither recognised nor appropriately addressed.

While the majority of quantitative research considering RRT effectiveness appears to support RRTs, disparity in the research remains. There is a growing awareness among
clinicians that this may be due to the fact that when comparing the wealth of available quantitative RRT studies, we are not comparing ‘apples with apples’ or ‘like with like’. Multiple determinants of RRT effectiveness are now recognised as having a significant impact on RRT success. A number of qualitative studies have been conducted asking the clinicians involved with RRTs what factors influence their success. To date, there does not appear to have been any published meta-synthesis of this qualitative evidence.

This review finds its purpose in the recent New Zealand Health Quality & Safety Commissions national patient deterioration programme. The author’s hospital is considering how to best implement the Commission’s directives and is currently looking at the form our efferent limb RRT will take. With a view to informing this process, this meta-synthesis has been undertaken to determine the factors that influence the effective implementation and management of RRTs within acute care hospitals.
Chapter 2. Method

Introduction

This chapter will begin by outlining the aim and review question. Next, qualitative research synthesis and its importance in the evidence based practice paradigm will be discussed. Meta-aggregation, the method chosen for data synthesis in this review, will then be described. Finally, the methodological process for this review will be outlined, including the search strategy, quality appraisal, and data extraction and synthesis.

Aim

The aim of this review is to carry out a meta-synthesis of qualitative research examining healthcare professionals’ experiences of RRTs.

Review Question

What factors do healthcare professionals identify as influencing their experience of the effective implementation and management of a RRT?

Evidence Based Practice & Qualitative Research Synthesis

Evidence based practice is now a well-established phenomenon within healthcare research. In the literature, it is variously described as Evidence Based Medicine, Evidence Based Healthcare, and as it will be described in this review, Evidence Based Practice (EBP). EBP describes a healthcare approach that “enables clinicians to provide the highest quality of care in meeting the multifaceted needs of their patients and families” (Melnyk, & Fineout-Overholt, 2005, p. 3). As a paradigm, its purpose is to enable healthcare professionals to provide care that is supported by the most up-to-
date evidence and knowledge available (Pearson, Wiechula, Court, & Lockwood, 2005).

EBP has its origins in the 1970’s when Professor Cochrane, a British epidemiologist, wrote a pioneering book criticising the medical profession for not using appropriate evidence to guide medical practice (Barker & Linsley, 2016). Cochrane believed that the strongest evidence available should be used to inform healthcare practice direction. In 1979, he famously claimed “it is surely a great criticism of our profession that we have not organised a critical summary, by specialty or subspecialty, adapted periodically, of all relevant randomised controlled trials” (Higgins, Churchill, Chandler, & Cumpston, 2017, p. 4). He proposed a rigorous process for systematically summarising the findings of a number of RCTs into a systematic review (Barker & Linsley, 2016). The resulting robust summation of evidence could then be used to directly inform medical practice. Following his death in 1988, supporters set up the Cochrane Centre in 1992. This centre continues to this day with the goal of promoting “evidence-informed health decision-making by producing high-quality, relevant, accessible systematic reviews and other synthesised research evidence” (The Cochrane Collaboration, 2018, no page).

Whilst Cochrane’s ideas initially faced some opposition, the medical profession gradually came to accept the concept (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996; Barker & Linsley, 2016), and in 2007, evidenced based medicine was recognised as one of the 15 major milestones in the development of modern medical practice (Dickersin, Straus, & Bero, 2007). The nursing profession quickly followed suit, adopting the principles of evidence based care-provision, and the phenomenon of EBP became well entrenched in most westernised countries (Pearson et al., 2005; Brown, 2018).

As a methodology, EBP championed empirical systematic reviews and meta-analysis. However, as the concept of EBP developed, clinicians began to recognise that other factors were also important in influencing the direction of best practice (Barker & Linsley, 2016). It was recognised that evidence from systematic reviews or RCTs only formed one of the components of EBP. Evidence from other research paradigms such as feasibility, appropriateness and meaningfulness; knowledge from clinical
expertise; and patient preferences and values, have all been identified as important
elements in EBP (Pearson et al., 2005; Melnyk & Fineout-Overholt, 2005).
Addressing the dissonance surrounding EBP, Sackett and colleagues provide a
definition that recognises the multifactorial nature of EBP:

“Evidence based medicine is the conscientious, explicit, and judicious use of
current best evidence in making decisions about the care of individual
patients. The practice of evidence based medicine means integrating
individual clinical expertise with the best available external clinical evidence
from systematic research (Sackett et al., 1996, p. 71-72).

However, other challenges face the use of solely empirical quantitative data to inform
EBP. While RCTs may remain the gold standard for effectiveness research (Barker &
Linsley, 2016; Popay & Williams, 1998), by their very nature they are somewhat
separated from real-world practice. Their strength lies in their ability to focus on
manipulating one intervention while excluding all other variables. Thus, the results
from the controlled, laboratory-like setting of a randomised trial may not be replicable
in real-world settings. The same issue naturally flows on to systematic reviews that
use RCTs. In order to ensure review validity, researchers aim to reduce contextual
influences by excluding studies with variations in methodology, interventions,
participants, and settings (Leeman & Sandelowski, 2012). Thus, one can readily see
the challenge facing clinicians using evidence stripped of real-world practice context
to inform their real-world practice.

The development of EBP and systematic meta-analysis brought new hope to many
advocates of qualitative research (Sandelowski & Barroso, 2007). Qualitative research
enquiry had long been the poor cousin to quantitative approaches in the research
world. Qualitative research seeks to explore the meaning of lived human experiences
(Polit & Beck, 2017). Yet due to the subjective nature of individual experiences, and
the fact that qualitative research sits within a paradigm that recognises truth as
interpretive, inductive and contextual (Ormston, Spencer, Barnard, & Snape, 2014),
findings from qualitative studies are not seen as generalisable (Leung, 2015).
Sandelowski & Barroso (2007) describe the problem stating that “because [qualitative
studies] are derived from ‘small’ and ‘non-representative’ samples and ‘subjective’
procedures, these findings are supposedly neither ‘reliable nor ‘valid’” (p. 2). However, somewhat ironically, qualitative research could be seen as ideally suited to informing practice, given that compared to quantitative methods and RCTs in particular, qualitative research is conducted in the real world and explores real-world situations (Popay & Williams, 1998; Sandelowski & Barroso, 2007).

The development of the EBP paradigm, and the recognition that EBP is not restricted to the use of quantitative meta-analysis (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996) opened new doors for qualitative researchers. With the aim of enabling qualitative research to take its place alongside quantitative meta-analysis in EBP, the process of qualitative meta-synthesis developed. Qualitative research synthesis describes the process of “systematically reviewing and formally integrating the findings in reports of completed qualitative studies” (Sandelowski & Barroso, 2007, p. 17). The approach involves piecing together the syntheses from individual studies into a new interpretive synthesis that explains the findings from a group of similar qualitative studies (Walsh & Downe, 2005; Sandelowski & Barroso, 2007).

Three years after the Cochrane Centre was set up, in 1996, the Joanna Briggs Institute (JBI) was established in Adelaide, Australia. The JBI sought to build on the work of the Cochrane Centre by focusing on making all forms of summarised evidence (not only quantitative systematic reviews and meta-analyses) accessible to clinicians working in practice (Lockwood, Munn, & Porritt, 2015). A particular focus of the Institute was the development of a systematic approach to qualitative meta-synthesis. In 2001, the JBI led a project that aimed to find a qualitative equivalent to the Cochrane Centre’s systematic review and meta-analysis of RCTs (Hannes & Pearson, 2012). Key elements to be included in this new qualitative evidence synthesis were a systematic approach; transparency of process; sensitivity to the contextual nature of qualitative research; and the development of findings that are both practical and usable in real-world settings (Hannes & Lockwood, 2011; Hannes & Pearson, 2012). This work led to the development of meta-aggregation: a systematic approach to qualitative meta-synthesis (Pearson, 2016).

Meta-aggregation describes the process of systematically collecting and synthesising findings from multiple qualitative studies into a collective whole that can be
generalised and used to inform EBP (Tufanaru, 2015). In developing the process of meta-aggregation, the JBI project team were heavily influenced by pragmatic philosophy (Hannes & Lockwood, 2011) and in particular, “the theory that knowledge is power and that the value of any thought lies in its practical use and consequences” (Hannes & Pearson, 2012, p. 22). Pragmatism finds expression in meta-aggregation through its ability to translate complex phenomena derived from qualitative studies into practical and usable findings (Hannes & Lockwood, 2011).

This review will use the JBI’s meta-aggregative approach to qualitative data synthesis. While multiple methods of qualitative systematic review are now described in the literature (Lockwood et al., 2017; Pope, Mays, & Popay, 2007; Sandelowski & Barroso, 2007), meta-aggregation has strengths that are believed to support the purpose of this review. Firstly, meta-aggregation does not seek to generate new knowledge or theory. Instead it aims to faithfully represent the knowledge already described in the individual studies (Tufanaru, 2015). Therefore, the collective knowledge gathered in meta-synthesis may be considered an accurate summary of available research. Secondly, meta-aggregative reviews may include qualitative studies from a range of methodologies. Given that the methodological foundation of a study becomes embedded in its findings (Lockwood et al., 2017), the faithful extraction and collation of those findings ensures the author’s intent and philosophical perspective are accurately represented. Finally, and perhaps most importantly in relation to EBP, meta-aggregation aims to generate findings that can be used to inform practice direction (Tufanaru, 2015). By categorising findings from multiple studies, generalisations can be made that lead to policy and practice recommendations (Hannes & Pearson, 2012). Using a meta-aggregative approach in this qualitative review will ensure a systematic approach that generates generalisable policy and practice-based recommendations, while remaining faithful to each study’s synthesis and philosophical perspective.

**Scoping Review**

Prior to conducting this review, in February 2018, a scoping exercise was carried out to see if any similar reviews had been undertaken. Two reviews were identified: a
literature review considering factors that impacted on nurses’ effective use of METs (Jones, King, & Wilson, 2009); and a systematic realist review considering early warning systems and rapid response to deteriorating patients (McGaughey, O’Halloran, Porter, & Blackwood, 2017).

Jones and colleagues (2009) literature review considered both quantitative and qualitative studies, and specifically focused on nurses’ use of METs. No other type of in-hospital response team was included in the reviewers’ search terms. McGaughey and colleagues’ (2017) sizable systematic realist review also incorporated both quantitative and qualitative research, reviewing 275 studies in all. While response teams were included in this review, their review question explored factors affecting the implementation of RRSs as a whole. Due to the size of the project, the reviewers’ note that they focused on the recognition arm and the ward response to patient deterioration rather than to RRTs in particular. Thus, to date, there does not appear to have been any published meta-synthesis of qualitative evidence relating to healthcare professionals’ experiences of the effectiveness of RRTs.

**Search Strategy**

To facilitate the search strategy, the review question was entered into the PICO framework (see Appendix A, Table 1). This framework was then used to describe the inclusion and exclusion criteria that would guide study eligibility for this review (see Appendix A, Table 1). Inclusion criteria included studies that involved all healthcare professionals’ experiences of RRTs. A preliminary literature search conducted for the research proposal in this review indicated that the majority of relevant research involved qualitative studies of nurses only. However, a small number of studies were found which included other healthcare professionals’ experiences of RRTs. Due to the fact that RRTs function within a multidisciplinary environment, it was felt that widening the research question and inclusion criteria to include studies that also considered other health professionals’ experiences would be beneficial.

Primarily, published, peer-reviewed studies were considered for review, although unpublished primary research was to be considered if published research was scarce.
To ensure the currency of studies, research published before the year 2000 was excluded. Studies were not restricted geographically, however, they had to be written in English, and full text had to be available in order to be eligible. In addition, to ensure congruity with the research aim of informing the implementation of a RRT in a tertiary level hospital, it was decided to restrict review studies to those conducted within secondary or tertiary level hospitals. Studies that focused on qualitative data from both the interpretive and critical paradigms were considered, including phenomenology, grounded theory, ethnography, and action research. Literature reviews, opinion pieces, and discussion papers were excluded. These eligibility criteria were defined prior to performing the literature search in order to reduce the chance of selection bias (Bettany-Saltikov & McSherry, 2016).

The PICo framework was also used to aid the development of key words and synonyms to be used in database searching. These are listed in Appendix B, Table 1. Due to the variety of terms used to describe in-hospital response teams and the lack of consistency evident in the literature, the terms Rapid Response Team, Medical Emergency Team, Critical Care Outreach Team, and Patient At Risk Team were all used in the search string. Various terms were used to capture studies that included a variety of healthcare professionals, including healthcare professional, healthcare personnel, doctor, physician, nurse, and allied health personnel. Different combinations of search terms were strung together, and then the resulting findings searched to ensure all relevant studies were retrieved. An example of a search string from each database is provided in Appendix B, Table 2.

Three online databases were searched: Google Scholar, PubMed, and CINHAL (see Appendix C, Table 1). The same search process was followed in each database. Citation searching was also conducted, and in Google Scholar, the “related articles” tab was used when relevant articles were found, to find additional relevant studies.
Quality Appraisal

Following the search, critical appraisal of the identified studies was conducted by three reviewers; the author, and the author’s two academic supervisors. The author appraised all 13 studies, while the two supervisors appraised half of the studies each (one six studies; the other seven studies). Using the additional two appraisers was intended as a means of minimising author bias. In order to ensure a consistent approach among reviewers, the JBI’s Critical Appraisal Checklist for Qualitative Research was utilised (Lockwood et al., 2017) (see Appendix D). JBI’s qualitative research checklist assesses studies for congruity between the stated philosophical perspective and the research methodology. Further, it appraises consistency between the research methodology and the research question, the method, the data analysis technique, and the interpretation of results. In addition, it considers the researchers’ representation of their participants; whether a declaration is made regarding their cultural and theoretical perspective; as well as whether the study is ethically sound.

Data Extraction

As previously described, the meta-aggregative approach to data extraction and synthesis was chosen as the method for this review. A single reviewer (the author) carried out the data extraction and synthesis.

The process of data extraction in meta-aggregation has been clearly described in the literature (see for example, Lockwood et al., 2017; Hannes & Pearson, 2012; Lockwood et al., 2015). In this review, it first involved using JBI’s standardised QARI Data Extraction Form for Interpretive & Critical Research (Lockwood et al., 2017) (see Appendix E, Figure 1). Chosen studies were carefully read at least twice to ensure understanding. Data extracted from studies included specific details such as citation information, methodology, phenomena of interest, setting, participants, and data analysis and conclusions relevant to the review question. Using this standardised form enabled a level of consistency and objectivity to be applied to the extraction of data from studies with a range of methodologies.
Findings in the form of themes or metaphors (Hannes & Pearson, 2012) were then identified from each study’s results section. The findings were generally easily identifiable: authors employed a structured approach, providing details of their finding, followed by a supporting verbatim quotation from one or more of the participants in their study. The following example provides an illustration of this:

“Participants identified several characteristics of RRT members that facilitated nurses’ decisions to activate the RRT. Participants believed RRT members had specialised training enabling them to more effectively manage seriously ill patients. Rapid response team members validated nurses’ concerns about patients’ conditions and offered their expertise. One participant commented, ‘Staff may know there’s something wrong, but can’t put their finger on it. The RRT nurse helps them identify the problem’. Another noted, ‘ICU nurses’ expertise is reassuring. They evaluate the situation... They figure out what is going on and decide what to do’ (Astroth et al., 2013, p. 2878).

In this example, the researcher’s finding clearly relates to the expertise and specialist training RRT members brought to the bedside as something that facilitated ward nurses activating the RRT. This finding was then documented as illustrated in Table one below:

<table>
<thead>
<tr>
<th>Finding</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialised training and expertise of RRT members enabling more effective management of seriously ill patients facilitates RRT activation (U) (Astroth et al., 2013)</td>
<td>✓</td>
</tr>
</tbody>
</table>
All study findings were recorded on the JBI’s Findings Form (Lockwood et al., 2017) along with supporting excerpts from the same study (Appendix E, Figure 2).

Each finding was then rated for its level of credibility: unequivocal, credible, or not-supported. Unequivocal describes findings that are beyond reasonable doubt and are clearly illustrated in the provided excerpt. Credible refers to findings that lack clear association with the excerpt provided, and thus could be challenged. A not-supported rating describes findings that are not supported by the data provided (Lockwood et al., 2017). These levels represent the reviewer’s opinion of how well study findings were supported by participants’ quotations that had been provided in the primary research.

In the example above from Astroth et al. (2013), the finding was rated with a ‘U’ as the verbatim participant quotation validated the finding reported by the researchers.

There were a number of findings reported in the studies that were not supported with participant quotations. The meta-aggregative approach does not preclude using unsupported statements from researchers. As Hannes & Pearson, (2012) point out, the word restrictions placed on authors submitting for journal publication, mean that they are often only able to summarise some of the participant views, and a lot of verbatim data is not able to be included. Therefore, this apparently unsupported information may be just as valid as the findings that have verbatim participant excerpts. Thus, it was decided to also include relevant author reported findings without study participant examples. These findings were assigned an ‘N’ for not-supported which highlights to the readers that these findings lack credibility due to their lack of supporting evidence, but also attempts to respect the veracity of the researchers by reporting all of their relevant findings. An example of this is again seen in Astroth et al. (2013) where they report:
“Participants identified several barriers to activation of RRT. Although communication of RRT members was noted by some participants to be facilitative, some RRT members did not exhibit communication styles that were perceived as supportive. Participants felt that the communication style of individual team members was, at times, abrupt and disconcerting to the unit nurses. Participants understood RRT members were seeking necessary information from staff, but body language and method of questioning were perceived to be negative.” (p. 2879)

In this extract, Astroth et al. (2013) summarise information provided by their study participants, however, they provide no verbatim examples to support their findings. Despite this, far from being vague and general, the author’s descriptions of participants’ perceptions are highly detailed and specific. This finding was summarised as illustrated in table two below:

<table>
<thead>
<tr>
<th>Finding</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abruptness, negative body language and method of questioning, condescension in the RRT ICU nurses’ tone of voice created barrier to RRT activation (N) (p. 2879) (Astroth et al., 2013)</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 2. Example of finding from JBI’s Findings Form

Thus, while the authors state they are reporting participant content, their finding in this case is not supported with verbatim participant evidence, and therefore it received a not-supported (N) level of credibility.

**Data Synthesis**

The process of data synthesis involved a number of steps. First the findings from the various studies were analysed and grouped or categorised according to similarity of theme, meaning, or concept. This step of categorisation involved forming an
explanatory statement that summarised the similar findings grouped under each category (Hannes & Pearson, 2012). For example, the following four findings in table three were extracted from the studies:

<table>
<thead>
<tr>
<th>FINDING</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to cross organisational &amp; professional boundaries (U) (Baker-McClearn &amp; Carmel, 2008)</td>
<td></td>
</tr>
<tr>
<td>RRT have direct links with ICU doctors and can facilitate speedier assessment and timely admission to ICU (U) (Baker-McClearn &amp; Carmel, 2008)</td>
<td></td>
</tr>
<tr>
<td>Quicker transfer to higher level of care or definitive care using the RRT (U) (Benin, Borgstrom, Jenq, Roumanis, &amp; Horwitz, 2012)</td>
<td></td>
</tr>
<tr>
<td>Ability to mediate boundaries between junior and senior medical team and the interface between ward and critical care (U) (Mackintosh, Rainey, &amp; Sandall, 2012)</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Example of review findings

These findings were categorised or grouped because they illustrated a similar theme: the ability of RRTs to work across interprofessional boundaries to facilitate and coordinate quick access to care for deteriorating patients. Therefore, the explanatory statement or category that the reviewer summarised this group of findings as was:

*Ability to work across interprofessional boundaries to facilitate and coordinate quick access to definitive care*

The final step in this meta-aggregative approach involved the meta-synthesis of categories. Categories were examined for similarity of theme or meaning, and similar categories were grouped together to form synthesised findings – statements that represent the collective meaning of the categories involved (Lockwood et al., 2017).

For example, the following seven categories were grouped together on the basis of similarity of theme:

**Synthesised Finding 2: RRT Member Characteristics and Functions Leading to Success**

1. Clinical knowledge and expertise of RRT members vital
2. Teamwork, team training, and consistency of approach vital for RRT members
3. Good communication leads to effective patient care
4. Negative experiences with the RRT creates a barrier to activation
5. Importance of bedside education and mentoring by RRT
6. Trust of ward staff built through proactive rounding and being supportive
7. Ability to work across interprofessional boundaries to facilitate and co-ordinate quick access to definitive care

All of these categories contained findings that related to characteristics and functions of RRT members that affected the ability of the RRT to function successfully. These categories were then grouped to form one larger category reporting important RRT member characteristics and functions. The synthesised finding for these seven categories is:

*RRT member characteristics and roles that influence effectiveness of the RRT include, advanced clinical knowledge and expertise, effective teamwork, consistency of approach, and good communication skills. The RRT has an important role to play in educating, mentoring, building trust and working across interprofessional boundaries to provide care for the deteriorating patient. Poor RRT member communication and behaviour compromises RRT success*

This process of grouping categories together in meta-synthesis resulted in the formation of two synthesised findings. As previously stated, a key component of the meta-aggregative approach is the development from theory of practical and useable actions (Hannes & Lockwood, 2011). Thus, these two synthesised findings form the basis from which this review’s practice recommendations are extrapolated. All of the findings making up these synthesised findings will be reported in the following results chapter.
As this review did not involve carrying out primary research, it did not require ethical approval from an ethics committee or review board. However, ethical principles were adhered to.

As previously noted, this review utilised the JBI’s Critical Appraisal Checklist for Qualitative Research for methodological assessment. This checklist includes a question assessing whether a study has been conducted in an ethical manner and approved by an appropriate body (Lockwood et al., 2017). Therefore, all studies included in this review underwent ethical assessment.

Since this review is a meta-synthesis of the research of others, the reviewer’s ethical responsibility involved treating their research with respect and endeavouring to accurately and fairly represent their work. Ethical considerations are often not taken into account in systematic reviews (Vergnes, Marchal-Sixou, Nabet, Maret, & Hamel, 2010). However, using JBI’s tool, and adhering to the ethical principles of respect, justice, and non-maleficence, (Polit & Beck, 2017) assisted in ensuring the ethical integrity of this meta-synthesis.

**Summary**

This chapter began by outlining the aim and review question underpinning the purpose of this review. Next, EBP, along with the emergence of qualitative meta-synthesis, was discussed. The JBI-developed process of meta-aggregation, a qualitative approach to meta-synthesis developed to replicate the Cochrane Centres process of quantitative meta-synthesis, was then described. The reasons for using this approach include the fact that meta-aggregation aims to faithfully represent the knowledge already described in the individual studies under review; that it allows for the synthesis of qualitative studies from a range of methodologies; and finally, that it aims to generate findings that can be used to inform practice direction. The use of this approach positions this review within the EBP paradigm.
The methodological process used in this review was then outlined, including the search strategy, quality appraisal, and data extraction and synthesis. The specific findings, categories and synthesised findings extracted and analysed will be outlined in the following results chapter.
Chapter 3. Results

Introduction

This chapter begins by reporting the results obtained from the review search and quality appraisal. Next, the articles chosen for review are detailed, and results from the data extraction and data synthesis are described. Finally, the findings, categories and synthesised findings resulting from the meta-aggregative process of data extraction and synthesis are reported.

Search Strategy

Three online databases were searched: Google Scholar, PubMed, and CINHAL. Following title review, 75 studies were chosen for closer examination. Article abstracts were then read to check for relevance to the review question, and irrelevant articles were discarded. Duplicates between the different databases were also discarded at this stage. This resulted in the number of articles being reduced to 16. Articles were then read to provide a further check for congruity with inclusion criteria as well as relevance to the review question. This brought the total number of relevant studies from database searching to 13 articles.

Quality Appraisal

Following quality appraisal, results were collated and studies going forward for inclusion were chosen using two criteria. Firstly, studies had to score at least seven ‘yes’ answers out of the ten questions on the JBI’s Critical Appraisal Checklist for Qualitative Research (Lockwood et al., 2017) (see Appendix D). Secondly, the study’s results and discussion had to provide relevant and direct quotations from study participants. All of the 13 articles appraised scored at least seven ‘yes’ answers, however, two of the appraised articles provided no verbatim quotations to back up their findings. To ensure rigor in meta-aggregative reviews, findings are only
considered credible if they are supported by direct quotations from research participants (Hannes & Lockwood, 2011). Thus, it was agreed by the appraisers that the two articles with no reported participant quotations would be excluded. This process of critical appraisal led to a further reduction of eligible studies from 13 to 11. The two studies that were excluded at this stage are found in Table 4 below.

<table>
<thead>
<tr>
<th>TWO FINAL EXCLUDED STUDIES</th>
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Table 4. Two final excluded studies

Results from the literature search, study assessment, and quality appraisal are provided in *Figure 1*. 
Description of Studies

Eleven studies were chosen for inclusion in this review. All studies were qualitative pieces of research, and were from peer-reviewed journals. Of the 11 studies, two
reported following an ethnographic methodological approach (Mackintosh et al., 2012; Smith & McSweeney, 2017), and one reported using a grounded-theory approach (Leach & Mayo, 2013). The remaining eight studies did not specify the exact methodological approach they followed, noting only that it was qualitative in nature. Methods used by all of the researchers for obtaining data were either individual face-to-face or group interviews, and participant information was analysed thematically.

As reported above, all articles were of a high methodological quality scoring seven or greater out of ten in the quality appraisal (see Appendix D). Studies scored least well in two questions: firstly regarding whether the influence of the researcher on the research was addressed. This was only addressed by Massey, Chaboyer, Aitken, (2014) and Rihari-Thomas, DiGiacomo, Phillips, Newton, & Davidson, (2017). Secondly, studies scored poorly regarding whether a statement locating the researcher culturally or theoretically was provided. This was only addressed by Kitto et al. (2015), Leach and Mayo (2013), Massey et al. (2014), and Rihari-Thomas et al. (2017).

Geographically, five studies were conducted in the United States of America, three were from Australia, two from the United Kingdom, and one was conducted in Iran. Six of the studies were conducted in single hospitals, with the remaining five being carried out among multiple hospitals. The number of hospitals covered in the studies ranged from one hospital in six of the studies to 18 hospitals in the study by Shapiro, Donaldson & Scott (2010). Participant numbers ranged from 15 (Astroth, Woith, Stapleton, Degitz, & Jenkins, 2013; Massey et al., 2014), to 100 (Baker-McClearn & Carmel, 2008).

A preliminary literature search conducted for the research proposal in this review indicated that the majority of relevant research involved qualitative studies of nurses only, and there was some concern that the research would not reflect the multidisciplinary nature of many hospital RRTs. However, the formal literature search found that this was not the case. Three of the eleven studies included nurse only participants (Astroth et al., 2013; Massey et al., 2014; Shapiro et al., 2010), three included both nurses and doctors (Jeddian et al., 2017; Kitto et al., 2015; Rihari-
Thomas et al., 2017), and the remaining five were multidisciplinary, including nurses, doctors, healthcare assistants, managers, administrators, and respiratory therapists (Baker-McClearn & Carmel, 2008; Benin et al., 2012; Leach & Mayo, 2013; Mackintosh et al., 2012; Smith & McSweeney, 2017). Thus, the studies chosen for review may be said to accurately represent the multidisciplinary nature of RRSs and RRTs in many hospitals.

A summary of the 11 chosen studies is provided in Appendix F.

**Data Extraction**

Study findings were recorded on the JBI’s Findings Form (Lockwood et al., 2017) along with supporting excerpts from the same study (Appendix E, Figure 2). An example of a completed data extraction form with findings and participant quotations is provided in Appendix G. Following this process, data extraction from the 11 chosen articles resulted in a total of 113 findings.

**Data Synthesis**

The process of data synthesis involved first grouping the 113 findings into categories, and then grouping the categories into synthesised findings. The 113 findings resulting from data extraction were grouped into 15 categories. Further synthesis of these categories resulted in the development of two synthesised findings. The categorisation of findings and categories was based on similarity of theme and meaning.

**Meta-syntheses**

Each synthesised finding is represented by a statement that describes the collective meaning of the categories grouped under it, which have been gathered from multiple studies. These synthesised findings will therefore be referred to as meta-syntheses throughout the remainder of this review. These meta-syntheses represent the
reviewer’s interpretation of the meaning or themes portrayed in the various categories. The two meta-syntheses emerging from this review will now be described.

**Meta-synthesis 1: System Factors Affecting RRT Success**

Meta-synthesis one describes the system factors that influence the effective implementation and management of a RRT. Of the two meta-syntheses, this is the largest, having both the most categories and findings in this review. This highlights the fact that system factors have a significant impact on RRT success. Meta-synthesis one is:

*System factors such as organisational leadership, communication, use of technology and innovation, and education surrounding RRT function and activation greatly influence the effectiveness of the RRT. System barriers include poor documentation and communication around RRT activation, dysfunction and conflict between the primary medical team and RRT, inadequate RRT staff resourcing, and ward perceptions and behaviours.*

Within this meta-synthesis there are eight categories, and 64 findings (see Table 5.).

**Organisational leadership and senior support encourages RRT activation**

This first category describes the importance of organisational leadership and senior nursing support to enable the success of the RRT. Eight findings are found in this category; four with unequivocal ratings, one with a credible rating, and three with a not-supported rating.

Participants described the importance of organisation leadership and active support for change to drive innovations in care delivery, such as RRT implementation (Leach & Mayo, 2013). Managerial support for patient safety strategies flowed through the organisation and was recognised by ward staff, reinforcing the importance of using the RRT. RRT implementation was also seen as a sign of managerial support to assist ward staff in attending to deteriorating patients (Shapiro et al., 2010).
Support from ward based senior nursing leaders was also vital for enabling ward staff to activate the RRT. One charge nurse participant noted that they tried to encourage anyone to call the RRT including aides and secretaries (Astroth et al., 2013). Senior nurses were reportedly used as a resource by junior nurses who consulted them regarding the need to activate the RRT (Kitto et al., 2015). However, seeking senior nurse support to activate the RRT could also lead to significant delays to RRT activation (Massey et al., 2014). The willingness of ward nurses to care for each other’s patients during RRT activation also facilitated nurses calling the RRT (Astroth et al., 2013).

**Technology and innovation facilitating the RRTs ability to function effectively**

This category focuses on the role technology and innovation plays in facilitating effective RRT functioning. It contains four findings, three with unequivocal ratings and one with a not-supported rating.

Study participants discussed the need for technological innovation around information sharing and clinical handover in order for RRTs to function effectively. In one study, junior doctors discussed how inadequate information technology systems were a barrier to RRT care. It was believed that information system based documentation to identify patients who had already required RRT calls or had had calling criteria modified, would lead to better clinical handover and prioritisation of patients on rounds (Rihari-Thomas et al., 2017). The use of electronic vital sign programmes to enable early identification and management of deteriorating patients was also reported as facilitating the RRT (Smith & McSweeney, 2017). Additionally, two findings highlighted the importance of developing innovative systems to recognise and respond to high-risk patient populations such as new admissions or those with sepsis (Astroth et al., 2013; Smith & McSweeney, 2017).
**Good communication surrounding RRT activation facilitates effective patient care while poor communication and documentation of RRT activation creates a downstream barrier to effective patient care**

This category describes system issues relating to team communication surrounding RRT activations and patient care. There are six findings in this category; five with an unequivocal rating and one with a credible rating.

In this category there were only two studies (Rihari-Thomas et al., 2017; Mackintosh et al., 2012), and five out of six findings derived from the same study (Rihari-Thomas et al., 2017). The findings relate to communication issues between primary day medical teams and after-hours RRT clinicians. Both studies investigated response teams that utilised this model: primary medical teams attended patients in hours, and non-primary medical teams provided an after-hours service. The communication problems illustrated in these findings arose due to miscommunication between these two teams. While the findings are predominantly from the same study, it was seen as beneficial to encapsulate this theme in one category as it represents a valid issue relating to this model of response that would not be found in models that have 24-hour RRT cover.

Study participants reported the importance of good handover communication between shifts to enable an understanding of RRT activations, plan of care, and to allow the day primary team to prioritise patients effectively (Rihari-Thomas et al., 2017). Poor communication at handover, and poor documentation by both the day and after-hours teams, led to time inefficiencies and poor patient management, especially relating to after-hours medical cover when making end-of-life decisions (Rihari-Thomas et al., 2017; Mackintosh et al., 2012).

**Education surrounding the function of the RRT and activation criteria facilitates RRT activation, while misuse, misunderstanding, and lack of education may affect success**

Of all the categories formed in this review, this category is the largest. This category reports on the importance of education surrounding the role and use of the RRT. Fourteen findings are included in this category; 10 unequivocal, two credible, and two
Successful RRTs had clear communication surrounding when to activate, and this was reinforced through hospital-wide training, education and communication (Shapiro et al., 2010). However, poor communication and mixed messages regarding when to call the RRT were reported as barriers to RRT activation (Shapiro et al., 2010). Two studies reported that participants misunderstood the purpose of the RRT and how it differed from the arrest team (Massey et al., 2014; Shapiro et al., 2010). A senior ward nurse also highlighted the potential problem of junior nursing staff lacking the expertise or confidence to initiate RRT calls (Rihari-Thomas et al., 2017). One study reported the confusion of some participants regarding RRT institutional policy, roles, documentation requirements, expected response times, the role of the primary nurse during RRT events and the supplies or equipment that would be needed by the RRT (Astroth et al., 2013). Misuse and over-reliance on the RRT was also highlighted, with participants reporting that the presence of the RRT enabled the primary nurse to leave their sick patient for the RRT to care for, and attend to their other patients and families (Shapiro et al., 2010; Jeddian et al., 2017). Furthermore, a number of studies reported participants using the RRT as a sort of work-around, or a way of elevating patient concern when they perceived the primary medical team was unavailable or not adequately taking care of their patient (Baker-McClearn & Carmel, 2008; Benin et al., 2012; Kitto et al., 2015).

Primary medical team expectations and behaviour a barrier to appropriate RRT activation and use

This category describes system barriers related to the interface between the RRT and the primary medical teams whose patients they attend. It contains 12 findings, 11 of which have an unequivocal rating, and one that has a credible rating.

Study participants reported that the primary medical team delayed or blocked RRT activation due to their expectation of being called first; viewed escalation and referral as a doctors’ role; or believed they were better able to address their patients deterioration (Astroth et al., 2013; Benin et al., 2012; Leach & Mayo, 2013). In two
studies, participants reported junior doctor’s reluctance to escalate patient deterioration due to fear of criticism from their senior specialists (Baker-McClearn & Carmel, 2008; Rihari-Thomas et al., 2017). In a further two studies participants reported being reprimanded by the primary team for activating the RRT (Benin et al., 2012; Shapiro et al., 2010). Conflict between the RRT and primary medical team was also highlighted in three studies. This conflict related to the perceived failure of the primary team; difference of opinion regarding patient care; and feeling threatened by the RRT when they arrived and assumed responsibility for the patient (Benin et al., 2012; Jeddian et al., 2017; Leach & Mayo, 2013).

**RRT role in de-skilling hospital staff**

This category reports on clinician’s feelings that RRT implementation is de-skilling hospital staff. Four findings are included, three of which have received an unequivocal rating, while the other has a not-supported rating.

All four of the findings reported very similar sentiments: RRT implementation has led to the de-skilling of junior hospital staff. In three of the studies, the participant reporting was a doctor, each of which believed that the RRT was removing learning opportunities for junior doctors (Baker-McClearn & Carmel, 2008; Benin et al., 2012; Kitto et al., 2015). In the final finding, the authors reported participant concerns that the RRT was reducing the exposure of both doctors and nurses to the trajectory of patient deterioration (Mackintosh et al., 2012). However, in two of these studies, the doctor involved reported accepting that activation of the RRT was in the best interest of patients (Baker-McClearn & Carmel, 2008; Kitto et al., 2015).

**Inadequate staff resourcing compromising ability of RRT to function effectively**

This category describes the effect inadequate staff resourcing has on the ability of the RRT to function effectively. This category contains 11 findings, all of which are rated unequivocal.

This category contains a significant number of findings highlighting the impact inadequate staff resourcing has on RRT function. Resourcing RRTs with staff who
also have other clinical responsibilities or a patient load during their shift was highlighted as problematic by participants in three studies (Benin et al., 2012; Shapiro et al., 2010; Smith & McSweeney, 2017). Perceived RRT resource deprivation led to ward staff delaying activation or not activating the RRT at all, rather than further burdening the team (Rihari-Thomas et al., 2017). In a tiered primary team model, the increased workload burden was especially felt after-hours when reduced staffing put further pressure on response team resources (Rihari-Thomas et al., 2017). Additional system issues surrounding staff resourcing include: rotating or fill-in medical staff in both the RRT and primary teams affecting continuity of care for patients (Jeddian et al., 2017; Rihari-Thomas et al., 2017); and ward nurses finding it challenging caring for a deteriorating patient during a RRT activation as well as their other patients (Shapiro et al., 2010).

**Staff perceptions and behaviours that are a barrier to RRT activation**

This final category in meta-synthesis one captures quite a wide variety of findings that related to ward perceptions or behaviours that are a barrier to RRT activation. Five findings are included, four with an unequivocal rating, and one with a credible rating.

In one study a nurse participant was described as believing they could manage situations on their own and therefore did not need to activate the RRT (Astroth et al., 2013). In another, individual inertia by senior nurses was reported, because of which they found the implementation of a RRT challenging (Shapiro et al., 2010). Ward resistance to RRT-initiated treatment plans was reported by RRT members, which impacted the provision of care for deteriorating patients (Jeddian et al., 2017). Finally, difficulty accessing specialist services was also reported as a barrier leading to delayed definitive treatment of deteriorating patients (Mackintosh et al., 2012).
## META-SYNTHESIS I. SYSTEM FACTORS AFFECTING RRT SUCCESS

<table>
<thead>
<tr>
<th>FINDING</th>
<th>CATEGORY</th>
<th>SYNTHESIZED FINDING</th>
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<tbody>
<tr>
<td>Importance of organisational leadership and active support to drive</td>
<td></td>
<td>Organisational leadership and senior support encourages RRT activation</td>
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<tr>
<td>innovations in care delivery (U)</td>
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<td>RRT implementation seen as tangible evidence of support from hospital</td>
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<td>System factors such as organisational leadership, communication, use of technology and innovation, and education surrounding RRT function and</td>
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<tr>
<td>management (C)</td>
<td></td>
<td>activation greatly influence the effectiveness of the RRT. System barriers include poor documentation and communication around RRT activation,</td>
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<tr>
<td>Support from nursing leaders to trust own judgement and activate RRT (U)</td>
<td></td>
<td>dysfunction and conflict between the primary medical team, ward staff and the RRT, inadequate RRT staff resourcing, and ward perceptions and behaviours</td>
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<td>Using senior nurses on the ward as a source of experiential knowledge</td>
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<td>and guidance as to whether to activate the RRS (U)</td>
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<td>Potential delay to RRT activation through seeking support from senior</td>
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<td>ward team members to validate clinical decisions and actions (U)</td>
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<td>Ward not discouraging activation and willingness to care for each</td>
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<td>other patients during a RRT event provided confidence to activate (N)</td>
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<td>Confidence to activate RRT provided when ward co-workers &amp; unit leaders</td>
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<td>were supportive (N)</td>
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<td>Willingness of ward nurses to care for each others patients during a</td>
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<td>RRT event provided confidence to activate (N)</td>
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<td>Importance of documentation (computer based information management</td>
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<td>systems) to identify patients who received RRT calls or had calling</td>
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<td>criteria modified, would lead to better clinical handover and</td>
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<td>prioritisation of sicker patients on rounds (U)</td>
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<td>Use of electronic vital sign programme to enable early identification</td>
<td>Technology and innovation facilitating the RRTs ability to function</td>
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<td>&amp; detection strategies of deteriorating patients (U)</td>
<td>effectively</td>
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<td>Early identification, review and pro-active treatment of at-risk patient</td>
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<td>groups (e.g. new admissions; sepsis) to reduce RRT activation (U)</td>
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<td>Ward practices that supported RRT activation included hourly rounding,</td>
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<td>a sepsis assessment tool, being attuned to clinical cues and</td>
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<td>listening to concerns from both nursing and ancillary staff members</td>
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<td>Good handover communication between shifts leads to good understanding</td>
<td>Good communication surrounding RRT activation facilitates effective</td>
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<td>of RRT activations and plan of care, and prioritised patient</td>
<td>patient care while poor communication and documentation of RRT activation</td>
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<td>management for the day (U)</td>
<td>creates a downstream barrier to effective patient care</td>
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<td>Poor communication: overnight RRT events not handed over to day</td>
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<td>primary teams (U)</td>
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<td>Poor continuity of care between primary medical team and after hours</td>
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<td>medical team leading to difficult decisions for non primary-medical</td>
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<td>teams making end of life decisions (U)</td>
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<td>Poor documentation: loss of paper based documentation &amp; evidence of RRT</td>
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<td>visit, or unclearly-highlighted RRT entries in the progress notes (U)</td>
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<td>Poor documentation of patient management plan during daytime primary</td>
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<td>team based RRT activations creating difficulties after hours when the</td>
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<td>different team covers responds to patient again (U)</td>
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<td>Time inefficiencies: poor documentation of patient management plans</td>
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<td>impact after hours RRT clinicians ability to meet their other</td>
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<td>workload demands (primary team based model) (U)</td>
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<td>Successful RRTs had clear communication surrounding when to activate</td>
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<td>the RRT reinforced through hospital wide training, education and</td>
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<td>communication (C)</td>
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<td>Poor communication regarding when to activate the RRT (C)</td>
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<td>Misunderstanding surrounding the purpose of RRT, how it differed to the</td>
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<td>arrest team, and its role in preventing deterioration a barrier to</td>
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<td>activation (U)</td>
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<td>Inexperienced junior nursing staff lacking expertise and confidence to</td>
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<td>activate RRT in a tiered initial primary team based model (U)</td>
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<td>Education surrounding the function of the RRT and activation criteria</td>
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<td>facilitates RRT activation, while misuse, misunderstanding, and lack of</td>
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<tr>
<td>education may affect success (C)</td>
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<td>Uncertainty about role and function of RRT: difficulty knowing when to activate the RRT verses when to call the code team (N)</td>
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<td>Lack of education on RRT institutional policy, roles, documentation, expected response times, the role of the primary nurse during RRT events, and supplies and equipment expected by RRT on arrival (N)</td>
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<tr>
<td>Perception that ward staff are calling the outreach team without considering other options (U)</td>
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<tr>
<td>Presence of RRT nurse freed up primary nurse to care for other patients while the team was present (U)</td>
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<tr>
<td>Ward staff over reliance on the RRT – expectation the RRT would care for the unwell patient (U)</td>
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<tr>
<td>RRT nurses used as way of elevating concern to doctors when other methods aren’t working (U)</td>
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<tr>
<td>RRT used as workaround to protect ward nurse-doctor relationship (U)</td>
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<tr>
<td>RRT used to get help when medical team not listening to ward nurses concerns (U)</td>
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<tr>
<td>RRT a formal workaround when the primary medical team was unavailable or not perceived to be adequately taking care of the patient (U)</td>
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<tr>
<td>RRT nurse more likely to be listened to by medical team than ward nurses due to good reputations (U)</td>
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<thead>
<tr>
<th>Delay in RRT activation due to primary medical team expectations of notification by ward staff before RRT activation (U)</th>
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<tbody>
<tr>
<td>Primary team believe they are better able to address patient deterioration due to their better knowledge of the patient (U)</td>
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<tr>
<td>Primary medical team blocking activation of RRT during initial formation of RRT related to disruption of the traditional role expectation of the doctor being in charge (U)</td>
</tr>
<tr>
<td>Primary team blocking RRT activation in order to prioritise their training leading to compromised patient safety (C)</td>
</tr>
<tr>
<td>Tension relating to activation of RRT by primary medical team derived from perception that RRT call implied primary physician failure of care (U)</td>
</tr>
<tr>
<td>Junior doctor reluctance to seek expert support and escalate care in antbien initial primary team RRS - particularly at night - was due to fear of incurring the wrath of senior specialist staff if they perceived to have disturbed them unnecessarily (U)</td>
</tr>
<tr>
<td>Escalation difficulty due to communication breakdown within the primary medical team where junior doctors are afraid to call consultant (U)</td>
</tr>
<tr>
<td>Primary team blocking activation of RRT: concern at being reprimanded due to a call being deemed un-necessary, or doctors insisting nurses follow chain of command (U)</td>
</tr>
<tr>
<td>Primary medical team discouraging or reprimanding ward nurses from calling RRT (U)</td>
</tr>
<tr>
<td>Difference of opinion relating to patient care between primary medical team and RRT (U)</td>
</tr>
<tr>
<td>Conflict between primary medical team &amp; RRT related to calling RRT before primary team (U)</td>
</tr>
<tr>
<td>Leadership of RRT nurse threatening to medical staff when RRT arrives and assumes responsibility for the patient (U)</td>
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<table>
<thead>
<tr>
<th>Perception that RRT's deskilling junior doctors (U)</th>
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<tbody>
<tr>
<td>Deskilling junior doctors (U)</td>
</tr>
<tr>
<td>RRT deskilling of junior medical staff by taking away learning opportunities to make difficult decisions through historically 'proven' apprentice style/experiential ways of learning (U)</td>
</tr>
<tr>
<td>Concerns RRT deskilling ward nurses &amp; doctors (N)</td>
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<tr>
<th>RRT role in de-skilling hospital staff</th>
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<tr>
<th>Inadequate staff resourcing compromising ability of RRT to</th>
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<tr>
<td>RRT calls a burden when they also have other clinical responsibilities as a patient lead during their shift (U)</td>
</tr>
<tr>
<td>Staffing the RRT problematic if RRT responders also have a patient lead in other areas of hospital (U)</td>
</tr>
<tr>
<td>Misdistribution of resources &amp; perception of increased workload burden especially overnight with reduced staffing in a</td>
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</tbody>
</table>

System factors such as organisational leadership, communication, use of technology and innovation, and education surrounding RRT function and activation greatly influence the effectiveness of the RRT. System barriers include poor documentation and communication around RRT activation, dysfunction and conflict between the primary medical team, ward staff and the RRT, inadequate RRT staff resourcing, and ward perceptions and behaviours.
<table>
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<tr>
<th>Perceived effective use of local resources (primary team) rather than activating the RRT when patients triggering a response (U)</th>
<th>Staff perceptions and behaviours that are a barrier to RRT activation</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Individual inertia' regarding adopting RRT implementation change (U)</td>
<td></td>
</tr>
<tr>
<td>Ward resistance to RRT initiated treatment plans (U)</td>
<td></td>
</tr>
<tr>
<td>Difficulty accessing specialist services (e.g. referrals to cardiology, surgery) due to antagonistic specialist behaviour following RRT activation leading to delayed definitive treatment (U)</td>
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Table 5. Meta-synthesis 1
Meta-synthesis 2. RRT Member Characteristics and Functions Leading to Success

Meta-synthesis two involves findings that relate to characteristics and functions of RRT members that influence the effective implementation and management of RRTs. This meta-synthesis includes seven categories, incorporating 49 findings (see Table 6.). The meta-synthesis is:

*RRT member characteristics and roles that influence effectiveness of the RRT include advanced clinical knowledge and expertise, effective teamwork, consistency of approach, and good communication skills. The RRT has an important role to play in educating, mentoring, building trust and working across interprofessional boundaries to provide care for the deteriorating patient. Poor RRT member communication and behaviour compromises RRT success*

*Clinical knowledge and expertise of RRT members vital*

The first category includes nine findings that related to vital clinical knowledge and expertise required by RRT members. All of the nine findings within this category have an unequivocal rating.

In this category study participants described the advanced clinical knowledge and expertise expected of RRT members. Participants reported that the RRTs specialised training and expertise facilitated ward nurses’ decisions to activate the RRT (Asteroth et al., 2013). The clinical knowledge of RRT members included the ability to make clinical decisions around goals of care such as do-not-resuscitate orders (Barker-McClearn & Carmel, 2008), or whether it was in a patient’s best interests to be admitted to the ICU (Barker-McClearn & Carmel, 2008). Expertise witnessed in the RRT included the ability to calmly and objectively manage crisis situations, and the ability to facilitate more complex diagnostic and treatment interventions (Shapiro et al., 2010). Nurse participants in one study reported that having RRT members who lacked critical care knowledge and expertise attend patient deteriorations was detrimental to patient safety (Rihari-Thomas et al., 2017).
Teamwork, team training, and consistency of approach vital for RRT members

This category includes seven findings, five of which are rated unequivocal, while two have been given a credible rating. This category describes the importance of teamwork, team training, and consistency of approach within the RRT. Study participants discussed the importance of RRT members having a shared purpose, and an understanding of how to go about achieving it (Leach & Mayo, 2013). The ability to cooperate and work collaboratively within the RRT were seen as important behaviours for RRT members (Leach & Mayo, 2013). In contrast, a chaotic and uncoordinated approach to managing the deteriorating patient by the RRT, made ward staff less likely to activate the RRT in the future (Massey et al., 2014). In a hospital with no formalised response team, the response varied considerably depending on who responded. Such ad-hoc services introduced heterogeneity in escalation and response behaviour with the potential to adversely compromise patient care (Mackintosh et al., 2012). The importance of collaborative multidisciplinary team training was also highlighted in a team made up of doctors and nurses who trained separately (Leach & Mayo, 2013).

Good communication leads to effective patient care

This category includes six findings, four of which are rated unequivocal, and two are rated not-supported. It describes the importance of good RRT communication to enable the effective management of deteriorating patients. In one study, participants reported that effective communication involved the RRT allowing the ward staff to give information, and RRT members being willing to have a dialogue (Leach & Mayo, 2013). The ability to use focused, objective communication tools such as SBAR to collect information quickly and accurately, was also reported by study authors as facilitating effective communication between the RRT and ward staff (Astroth et al., 2013). However, failure to communicate with the primary medical team was highlighted in two studies as problematic. In these studies, participants reinforced the need to keep primary teams informed of RRT actions with their patients (Baker-McClearn & Carmel, 2008; Smith & McSweeney, 2017).
**Negative experiences with the RRT causes barrier to RRT activation**

In this category there are seven findings; five of which have an unequivocal rating, one that is rated credible, and one that has a not-supported rating. This category incorporates findings that report the barrier that negative experiences with the RRT cause leading to reduced RRT activation. In two studies, nurses reported delaying or failing to call the RRT due to fear of appearing stupid to RRT members (Astroth et al., 2013; Massey et al., 2014). Another three studies reported ward staff being reprimanded by RRT members for perceived inappropriate RRT activation (Astroth et al., 2013; Kitto et al., 2015; Massey et al., 2014). This behaviour was seen as a barrier to future RRT activations.

In an unsupported finding, study authors noted that abruptness, negative body language and method of questioning, and condescension in the RRT nurses’ tone of voice all created a barrier to RRT activation (Astroth et al., 2013).

**Importance of bedside education and mentoring by RRT**

This category describes the importance of bedside education and mentoring of ward staff by the RRT. This category includes 10 findings, eight of which have an unequivocal rating, while two have a not-supported rating. The high number of findings represented in this category illustrates the importance that study participants placed on the RRT’s education and mentoring role.

Ward staff discussed the appreciation and empowerment they felt through bedside education and training provided by the RRT (Astroth et al., 2013; Baker-McClearn & Carmel, 2008). Study participants used words such as support, nurture, coach, mentor, educator, and resource to describe the RRT’s role (Astroth et al., 2013; Benin et al., 2012; Smith & McSweeney, 2017). The following up of patients several hours after the RRT event, and the use of informal debriefing with ward staff, were also reported as beneficial for ward staff leading to enhanced critical thinking (Astroth et al., 2013; Smith & McSweeney, 2017). Interestingly, informal bedside education was noted to be more effective than irregular formal education in imparting advanced clinical skills (Baker-McClearn & Carmel, 2008). Working in the RRT was also reported to be a
good way for rotating doctors to get exposure to acutely unwell patients (Benin et al., 2012).

**Trust of ward staff built through proactive rounding and being supportive**

The findings in this category collectively describe the trust and support RRT members provide for ward staff. This category includes five findings; three with an unequivocal rating, one with a credible rating, and one with a not-supported rating.

In one study, a nurse participant described how the RRT tried to calm her down providing her with emotional support (Astroth et al., 2013). Study authors also noted that the RRT was reported as a supportive team that provided almost immediate assistance (Astroth et al., 2013). In three of the five findings, participants reported how the practice of proactive rounding (where the RRT members actively visited wards when not on RRT activations) enabled RRT members to build relationship and trust with ward nurses (Astroth et al., 2013; Leach & Mayo, 2013; Smith & McSweeney, 2017). This trust was also noted to have grown over time, following the introduction of the RRT through the regular interaction of the RRT with ward staff (Leach & Mayo, 2013).

**Ability to work across professional boundaries to facilitate and co-ordinate quick access to definitive care**

The final category in meta-synthesis two describes the ability of the RRT to work across professional boundaries to facilitate and co-ordinate quick access to definitive care of the deteriorating patient. This category includes four findings, all with an unequivocal rating.

RRTs work with multiple medical specialties and therefore require the ability to work across both organisational and professional boundaries (Baker-McClearn et al. 2008). The RRT’s ability to mediate the boundary between the junior and senior medical team facilitated the coordination of deteriorating patients (Mackintosh et al., 2012). Study participants also reported that the RRT was able to mediate the boundary between the ward and the ICU (Mackintosh et al., 2012), and that the direct links that
RRT members have with the ICU team facilitated more rapid access and transfer to definitive care (Baker-McClearn et al. 2008; Benin et al., 2012).
# Meta-Synthesis 2. RRT Member Characteristics & Functions Leading to Success

<table>
<thead>
<tr>
<th>FINDING</th>
<th>CATEGORY</th>
<th>SYNTHESIZED FINDING</th>
</tr>
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<tbody>
<tr>
<td>Specialised training and expertise of RRT members enabling more effective management of seriously ill patients facilitates RRT activation (U)</td>
<td></td>
<td>Clinical knowledge and expertise of RRT members vital</td>
</tr>
<tr>
<td>RRT nurses extra knowledge used in clinical decision making around do not resuscitate and not for ICU (U)</td>
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<tr>
<td>RRT’s knowledge &amp; expertise seen as foundational to carrying out the RRT’s purpose of resuscitation (U)</td>
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<tr>
<td>RRT members must be able to calmly and objectively manage crisis situations (U)</td>
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<tr>
<td>RRT brought extra expertise and resource to the bedside (U)</td>
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<tr>
<td>Expertise of RRT nurses expedited initiation of complex diagnostic and treatment interventions, transfers to higher level of care, and physicians responded “better” to the reports and clinical observations of RRT nurses (U)</td>
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<tr>
<td>Important considerations in choice of RRT members: critical care expertise (U)</td>
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<tr>
<td>Ability of RRT nurse to initiate or facilitate treatment during RRT calls through the use of protocols and standing orders (U)</td>
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<tr>
<td>Use of clinicians in RRT who lack the expertise problematic – medical response to RRT activation left to most junior doctors (U)</td>
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<tr>
<td>Importance of shared understanding of purpose, goal and use of the RRT (U)</td>
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<td>Familiarity with members of the RRT enables trust (U)</td>
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<tr>
<td>Collaborative teamwork, cooperation, coordination and a willingness to work together important qualities for RRT members (U) (Leach &amp; Mayo, 2013)</td>
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<tr>
<td>Shared leadership between RRT doctors and nurses during a call (C)</td>
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<tr>
<td>RRT members (nurses and doctors) noted to train separately. Importance of collaborative multidisciplinary RRT training highlighted (U)</td>
<td></td>
<td>Teamwork, team training, and consistency of approach vital for RRT members</td>
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<tr>
<td>Lack of a formalised response strategy introduced heterogeneity in response behaviour across the organization (U)</td>
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<tr>
<td>Lack of organised approach to RRT calls make ward staff less likely to activate a RRT in future (C)</td>
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<tr>
<td>Open focused non-intimidating communication, good listening skills, and open dialogue vital for team effectiveness (U)</td>
<td></td>
<td>Good communication leads to effective patient care</td>
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<tr>
<td>Listening skills and use of humour to defuse tense situations (N)</td>
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<tr>
<td>Professional communication skills: RRT members used SBAR to collect information quickly &amp; accurately (N)</td>
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<tr>
<td>Importance of communicating RRT actions with primary medical team (U)</td>
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<tr>
<td>RRT not informing primary consultant of their patients deterioration before referring to ICU (U)</td>
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<tr>
<td>RRT staff taught how to confidently communicate with doctors (U)</td>
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<tr>
<td>RRT members questioning ward staff’s need to call (U)</td>
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<tr>
<td>Missed RRT calls due to ward staff fear of getting reprimanded by RRT members if they were perceived as activating the RRT incorrectly (U)</td>
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<td>Negative experiences with the RRT creates a barrier to activation</td>
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<tr>
<td>Negative response from RRT members affecting decisions to use RRT again (U)</td>
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<tr>
<td>Resisting and hesitating activating the RRT due to fear of looking stupid or being reprimanded or through fear of the</td>
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<td>RRT through previous bad experiences (U)</td>
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<tr>
<td>Less experienced nurses fearful of appearing stupid to ICU RRT members (U)</td>
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<tr>
<td>Demanding unrealistic expectations of RRT on ward staff (C)</td>
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<tr>
<td>Abruptness, negative body language and method of questioning, condescension in the RRT ICU nurses’ tone of voice created barrier to RRT activation (N)</td>
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<tr>
<td>RRT members mentoring, guidance, education, and continued follow-up on patients’ conditions several hours after the event appreciated (N)</td>
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<tr>
<td>Empowerment of ward nurses from enhanced knowledge through education and training by RRT (U)</td>
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<tr>
<td>RRT as a learning tool especially to support &amp; nurture junior doctors and nurses (U)</td>
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<tr>
<td>Improving ward nursing knowledge through education &amp; training by RRT (U)</td>
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<tr>
<td>RRT as coach, mentor, educator, and resource to ward staff during RRT calls (U)</td>
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<tr>
<td>RRT use of debriefing with ward staff after the event enhances critical thinking and education (U)</td>
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<tr>
<td>Informal bedside teaching by RRT during activations very effective (N)</td>
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<tr>
<td>Working in the RRT good way for rotating doctors to get exposure to acutely unwell patients (U)</td>
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<tr>
<td>Little benefit of formal education of advanced clinical skills for ward nurses unless using regularly (U)</td>
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</tr>
<tr>
<td>Failure of formal education &amp; training strategies relating to RRS to change or improve ward behaviour (U)</td>
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<tr>
<td>RRT nurses providing emotional support (U)</td>
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<tr>
<td>RRT a supportive team providing almost immediate assistance (N)</td>
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<tr>
<td>Proactive rounding or surveillance: develop relationships with ward staff and proactively attend sickest patients (U)</td>
<td></td>
<td></td>
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<tr>
<td>Importance of proactive rounding or ‘surveillance’ enables relationship and trust building with ward nurses (U)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Familiarity of RRT nurses &amp; ward nurses and built trust as contributor to team performance (built over time &amp; through daily rounds – proactive rounding) (C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to cross organisational &amp; professional boundaries (U)</td>
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<tr>
<td>RRT have direct links with ICU doctors and can facilitate speedier assessment and timely admission to ICU (U)</td>
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<tr>
<td>Quicker transfer to higher level of care or definitive care using the RRT (U)</td>
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<td></td>
</tr>
<tr>
<td>Ability to mediate boundaries between junior and senior medical team and the interface between ward and critical care (U)</td>
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</table>

| Importance of bedside education and mentoring by RRT |
| Trust of ward staff built through proactive rounding and being supportive |
| Ability to work across professional boundaries to facilitate and co-ordinate quick access to definitive care |

*Table 6. Meta-synthesis 2.*
Summary

This chapter has reported the results obtained from the literature search, data extraction and data synthesis processes. Following JBI’s meta-aggregative approach, 113 findings were extracted from the reviewed studies. These were arranged into 15 categories, and then further grouped into two meta-syntheses. Meta-synthesis one describes the system factors that either facilitate or create a barrier to effective RRT management. Meta-synthesis two focuses on the member characteristics and functions that influence effective implementation and management of a RRT. These findings will now be discussed.
Chapter 4. Discussion

Introduction

Rapid Response Teams represent the efferent limb of the RRS; they are an organisational safety net designed to recognise and respond to patient deterioration in acute care hospitals. While the majority of quantitative research considering the effectiveness of RRTs appears to support their implementation, some questions remain. There is a growing awareness that this may be due to multiple factors that can influence the effectiveness of RRTs that are not accounted for in many quantitative studies. A number of qualitative studies have now been conducted asking the clinicians involved with RRTs what factors influence their success.

The aim of this review was to carry out a meta-synthesis of this qualitative research, exploring healthcare professionals’ experiences of working with, implementing and managing RRTs. This review found its purpose in the planned implementation of a RRT within the author’s place of employment – a tertiary level hospital. It is hoped this review will assist in determining some of the factors that influence the effective implementation and management of RRTs, and that this information can be used to inform the development of a successful RRT. To this end, this chapter will now discuss the meta-syntheses developed in chapter three as well as draw on other literature to aid in the development of practice recommendations to inform the development of a RRT within the author’s hospital.

Discussion of Findings

The qualitative studies reviewed in this meta-synthesis were unanimously supportive of RRTs. The reviewed studies reinforce the quantitative data highlighted in chapter one, indicating that RRTs are an effective patient safety strategy. This review adds to a growing body of literature describing factors that influence the success of RRTs within the acute care hospital setting.
Two meta-syntheses were developed from the findings of the studies reviewed. The first, meta-synthesis one, includes findings that describe system factors influencing the effective implementation and management of a RRT. Meta-synthesis two describes the characteristics and functions of RRT members that impact on the effective implementation and management of RRTs. The review findings will now be discussed under the headings of these two meta-syntheses.

**Meta-synthesis 1: System Factors Affecting RRT Success**

Meta-synthesis one incorporates system factors that influence the effective implementation and management of RRTs. Of the two meta-syntheses, meta-synthesis one included the most findings and categories in this review. This illustrates the important role system factors play in RRT success. Study participants highlighted a diversity of system factors that impact the running of RRTs. Some of these factors positively influence RRT implementation, while others limit the success of the RRT. Interestingly, there were four system factors identified that can positively influence the implementation and management of RRTs, and four that may be detrimental. The four facilitating factors include organisational leadership and support, technology and innovation, good communication, and education. The four factors that were barriers to RRT success were dysfunction and conflict between the RRT and ward staff, the perceived role of the RRT in deskilling ward staff, inadequate RRT staff resourcing, and negative perceptions and behaviours of ward staff.

System factors highlighted in this review that facilitated RRT success begin with good organisational leadership and support. Active support from hospital administrators and clinical leaders for the RRT encouraged ward staff in their commitment to patient safety (Leach & Mayo, 2013). RRTs are part of the complex and multifacetted RRS that operates across the entire hospital organisation, and therefore requires support, leadership, and governance from both clinicians and administrators (Hillman, Nosrati, & Braithwaite, 2017; Grimes, Thornell, Clark, & Viney, 2007). Strong organisational leadership is required so that response teams do not become “…a panacea for inadequate staffing, insufficient educational preparation or poor organisational systems” (Davies, 2011, p. 116). Ongoing organisational commitment and support for the RRS is therefore pivotal to the successful
implementation and management of a RRT. In fact, administrative support and governance were seen by many as so essential to RRT success, that they have been given the position of a separate and distinct arm of the RRS in many hospitals (Rao & DeVita, 2017; Heland & Jones, 2017).

Senior support for the RRT is not only important at an administrative and managerial level, it was also highlighted as vital on the wards themselves (Astroth et al., 2013; Kitto et al., 2015). Junior nurses and doctors look to their senior nurse or medical staff for support and advice regarding calling the RRT when they are caring for a deteriorating patient (Massey, Chaboyer, & Anderson, 2016; Buist, Harrison, Abaloz, & Van Dyke, 2007). Support and unqualified endorsement of RRT activation by senior ward staff is therefore instrumental to the success of a RRS (Robb, & Seddon, 2010; Donaldson, Shapiro, Scott, Foley, & Spetz, 2009). If this support is unavailable, afferent limb function of the RRS may be severely hampered, leading to a reduced number of RRT calls, and thus, decreased success. This finding was highlighted in a survey conducted in a tertiary paediatric hospital in Melbourne, Australia, which investigated attitudes and barriers to the activation of a MET. The researchers found that a significant number of delayed MET activations were attributable to a lack of support, and indeed, active discouragement from ward-based clinicians (Azzopardi, Kinney, Moulden, & Tibballs, 2011). Interestingly, the researchers noted that junior and inexperienced staff were significantly more likely to report such barriers to activation compared to their senior ward colleagues.

The hierarchical nature of the ward environment in many hospitals means that step-wise escalation occurs, by which junior nurses are expected to escalate concerns for patient deterioration to senior ward nurses, and once their knowledge and skills are exhausted, then escalate on to junior ward doctors until their knowledge and skills are exhausted, and so forth (Massey et al., 2016; Roberts et al., 2014). This hierarchical motivated practice delays RRT activation and may lead to delays in appropriate clinical intervention for the deteriorating patient. Therefore, encouraging senior ward staff to promote a clinical culture that empowers junior nurses and doctors to make timely and appropriate activations of the RRT is vitally important to the success of the RRT - and ultimately patient safety.
While organisational support facilitates RRT success, a lack of organisational support in many instances has created a barrier to RRT success. This is evidenced in the inadequate staff resourcing of many RRTs highlighted by a number of studies in this review (Rihari-Thomas et al., 2017; Shapiro et al., 2010; Jeddian et al., 2017). In ICU-based RRTs, response staff may have patient loads or responsibilities additional to responding to RRT calls. In primary team models, activation of the RRT takes the primary team member away from other patient duties. In some cases resourcing problems may be a result of historical factors, related to the fact that RRTs were an initiative that were first developed and implemented on the front lines by critical care clinicians. As a consequence, many of these teams reportedly lacked organisational support and, in many cases, had to ‘make do’ without any increase in resource allocation (Winters & DeVita, 2017). This appears to have been the case within the vast majority of Australian hospitals. In an Australian study conducted in 2012, which surveyed 39 hospitals, investigators found that while all participating hospitals had a 24-hour-a-day, seven-days-a-week RRT service, only 25% were funded (ANZICS-CORE MET dose Investigators, 2012).

Rapid Response Team resourcing in New Zealand hospitals may be even more sparse than in Australia. A New Zealand hospital census conducted in 2014 found that only 45% of acute care hospitals had response teams, with only 20% of these being 24-hour-a-day, seven-days-a-week services (Pedersen et al., 2014). The researchers note that the in-ability of hospitals to implement RRTs was likely due to a lack of perceived need, and limited resources. More recently, with the implementation of the Health Quality and Safety Commission Patient Deterioration Programme, RRTs have become an accepted patient safety strategy in their own right (Wailing & Psirides, 2006). To ensure the success of this nationwide programme, organisational support and appropriate staff resourcing must become a priority.

Many professional health organisations have developed standards that set best-practice guidelines for RRT staffing. For example, for Intensive Care based RRTs within Australia and New Zealand, the College of Intensive Care Medicine’s minimum standards for ICUs state that, “duties outside of the ICU must be staffed by personnel additional to those required for managing patients within the ICU, and must not compromise care of patients within the ICU” (College of Intensive Care
Therefore, ICU-based RRTs must be adequately resourced to ensure staff attending RRT activations do not leave their patients uncared for in the ICU. ICUs that do not meet this criterion will not receive accreditation. In primary team response models, after-hours staffing is generally reduced, and team activation requires covering medical team staff to interrupt the care provision for one patient to attend to the RRT call of another (Rihari-Thomas et al., 2017). Therefore, an after-hours primary team based model can increase workload burden and became a barrier to successful RRS functioning.

Determining adequate RRT staff resourcing is dependent on hospital size and type. As noted in chapter one, the Sapere report provides guidance for New Zealand hospitals looking to implement RRTs. For large hospitals it describes a 24-hour-a-day, seven-days-a-week-service (Moore & Poynton, 2015). As one of the five tertiary level hospitals within New Zealand, the author’s place of work would likely fall into the category described as *large* in the Sapere report. Thus, the implementation of a response team within the author’s hospital should include such comprehensive cover, with RRT staff who are either supernumary, or who have additional staff resource available to cover them when called to attend RRT activations. No matter what model of response is utilised, appropriate staff resourcing is essential to ensure RRT success.

The use of technology and innovative ways of care delivery were identified in this review as important factors leading to RRT success. The use of computer-based information systems that data-mine electronically recorded vital signs and automatically total early warning scores, improved detection of the deteriorating patient (Smith & McSweeney, 2017). Electronic technology use in the recognition and escalation of the deteriorating patient shows great promise. This technology has been associated with a significant reduction in patient mortality (Schmidt et al., 2014; Subbe, Duller, & Bellomo, 2017). Some hospitals using electronic health records are now also incorporating the automated notification of abnormal laboratory tests into their recognition and response systems (Rojas, Shappell, & Huber, 2017).

However, over-reliance on automated vital sign monitoring can lead to nurses being less vigilant to patient deterioration (Chua et al., 2017). This issue was highlighted in a study that considered factors associated with delayed MET activation and increased
mortality. Researchers found that patients that had automated vital sign monitoring were twice as likely to experience delayed MET activation compared with patients without automated monitoring (Tirkkonen et al., 2013). This is of significant concern considering many hospitals are moving toward the use of electronic vital sign monitoring. The Health Quality and Safety Commission reported that two hospitals in New Zealand already have electronic vital sign programmes, and this number is expected to increase over the next five years (Health Quality & Safety Commission, 2016b). Therefore, hospital leaders need to ensure ward staff receive education to safeguard against the over-reliance on automated vital sign monitoring that can lead to delays in RRT activation.

The importance of developing innovative programmes to proactively treat at-risk groups, such as patients with sepsis, was also highlighted in this review (Astroth et al. 2013). In one such programme that aimed to improve the recognition and treatment of septic patients, it was found that electronic monitoring and automated alerts contributed to reduce the likelihood of death, ICU and hospital length of stay, and the need for mechanical ventilation (Guirgis et al., 2017). The use of such innovative programmes and technologies have been shown to be effective in addressing afferent limb failures and should be actively explored by those hoping to develop and manage successful RRSs.

A significant system problem highlighted in seven of the eleven articles reviewed related to the interface between the primary medical team and the RRT. In some instances, the behaviours and actions of the primary medical team created a barrier to RRT activation and success (Baker-McClearn & Carmel, 2008; Shapiro et al., 2010). RRT’s represent an innovative hospital-wide initiative that sits outside of traditional hospital specialties, working across interprofessional boundaries. By design, they are called upon to intervene, provide advice, and administer treatment to deteriorating patients. Yet this intervention may be seen as unwanted interference by a primary medical team who feel they should be managing their patients themselves. As highlighted in this review, this has in some instances led to ward nurses being reprimanded by primary teams for activating the RRT, as well as conflict between the RRT and primary teams.
One of the factors at the heart of this problem is the belief that the need for RRTs emphasises the failure of primary medical teams to adequately care for their patients (Benin et al., 2012; Litvak & Pronovost, 2010). While to some extent this may be true, it is an over-simplification of a complex issue. The organisation and model of modern twenty-first century hospitals makes caring for critically unwell patients difficult for many medical sub-specialties. The siloed nature of medical specialisation in modern hospitals results in increasing incompetence in areas not related to a specialist’s primary area of expertise (Davies, DeVita, & Hillman, 2017). When a patient being cared for by one such specialist team deteriorates, the critical care knowledge and expertise required to address this deterioration - which is a specialty in its own right - may be outside of the normal knowledge and skill set of many primary medical personnel. Therefore, one could question whether the primary team are best positioned to deal with acutely deteriorating patients. Additionally, the under resourcing of primary medical teams may mean that timely, appropriate treatment is unavailable. This is certainly true within the author’s current place of employment where requests for primary medical review may be hampered due to the primary team being busy in an outpatient clinic, admitting patients in the Emergency Department, or operating on patients in theatre.

There is also a perception among some primary medical teams that RRTs de-skill ward staff, removing valuable learning and teaching opportunities for junior nurses and doctors (Baker-McClearn & Carmel, 2008; Benin et al., 2012; Kitto et al., 2015). As well as being evident in the findings of this review, this perception has been witnessed first-hand in discussions among clinicians. In fact, a recent systematic review, reported that the perception of threatened de-skilling was the biggest barrier stopping junior doctors activating the RRT (Chua et al., 2017). Irrespective of whether this de-skilling is real or imagined, it creates a barrier to effective RRT implementation and management.

It should be acknowledged that there is some evidence to support the notion that RRT’s can de-skill primary teams. In a survey of Australian ICU medical trainees working in the MET, 55% reported that they felt they were doing the job of ward primary medical teams during MET activations. They also reported that ward medical staff failed to take responsibility for their sick patients (Jacques, Harrison, &
McLaws, 2008). However, a more recent survey, also conducted in Australia, reported that the failure of RRT members to involve ward staff in decisions regarding their patient’s care was associated with a reduced likelihood of ward staff making a subsequent RRT activation (Chalwin, Flabouris, Kapitola, & Dewick, 2016). Therefore, it could be argued that the perceptions of de-skilling may relate to RRTs that fail to involve primary team staff in their treatment of the deteriorating ward patient, or to RRTs that work within hospital cultures that do not see the RRT as an adjunct to the primary team, but rather a function that takes over care until after the end of the RRT episode.

Thus, despite the perceived de-skilling highlighted in this review, at present, this notion appears to be anecdotal rather than evidence based. As will be seen in meta-synthesis two, significantly more participants reported that bedside support, mentoring and education provided by RRT members were a significant factor leading to RRT success (see Importance of bedside education and mentoring by RRT in chapter 3; and Meta-synthesis two below). It may, therefore, be concluded that the issue of perceived de-skilling can be overcome by addressing hospital culture, and through effective RRT design (Chua et al., 2017). This is supported in a recent study conducted in a New Zealand hospital where, rather than de-skilling, ward staff reported that a PART taught them how to identify and manage deteriorating patients more effectively (Wood, Pirret, Takerei, & Harford, 2017). This outcome was also reported in an Australian study that explored nursing and medical perceptions of a MET. Researchers found that 86% of staff disagreed that the MET reduced their skills, and instead, 63% believed that the MET improved their ability to manage deteriorating patients (Douglas et al., 2016).

A further barrier to RRT success highlighted in this review related to the primary team’s expectation that ward nurses and junior doctors consult them before activating the RRT (Astroth et al., 2013). This behaviour represents a major barrier to RRT activation, encouraging ward staff to attempt to manage patients on wards without the skills and input of the RRT (McGaughey, O’Halloran, Porter, & Blackwood, 2017). A 2009 literature review considering factors that impact nurses’ effective use of METs reported that this behaviour is not uncommon. The researchers described how numerous reviewed studies revealed that ward nurses continue to call the primary
medical team, rather than calling the MET as their hospital policy dictated (Jones et al., 2009). Similarly, Chua and colleagues (2017) conducted a systematic review in which 18 of the 30 included studies highlighted that while having functional RRTs, ward staff still maintained allegiance to the traditional model of hierarchical escalation. The researchers noted that delays in activation caused by this behaviour were “made worse with expectations from the upper hierarchy that ward nurses and junior physicians should attempt stabilising measures before seeking medical assistance” (Chua et al., 2017, p. 995).

This adherence to the traditional hierarchical referral process may be addressed by designing a response system that addresses the concerns of primary medical teams. RRSs rely on timely activation of the RRT to address patient deterioration. This usually involves calling the RRT and not the primary medical team when activation criteria are met. Over-riding the primary medical team represents a perceived challenge to their competence and a challenge to medical autonomy (Chua et al., 2017). Developing a RRS that activates both the RRT and primary team concurrently, and ensuring that RRT members work in a supportive way enabling the primary team to maintain control, may go some way to address primary team concerns. As O’Horo and colleagues (2015) conclude, “the RRT should be an adjunct to, rather than a substitute for, an engaged and present primary care team” (p. 357). Getting the design and function of the RRT right at the development phase, and engaging primary medical teams in this process is crucial to the success of the RRS.

To some extent, these difficulties can be addressed through the use of a primary medical team response. In these models, it is the primary medical team that is called, and this team reviews and intervenes to address the deterioration of their patient. However, as illustrated by the results of this review, these models present difficulties of their own. Primary teams usually have good staff coverage during the day, with both specialist consultants and registrars available. However, they face inherent resourcing issues, with after-hours response cover often relying on a reduced medical resource, and often by non-primary team doctors (Rihari-Thomas et al., 2017). Communication issues between the primary team and covering after-hours doctors were also highlighted as a significant system problem in review studies: issues included a lack of clear documentation from primary teams surrounding goals of care.
and previous response team activation, which led to increased work burden for under-resourced after-hours teams; and difficulties with the handover of information between the night team and day teams (Mackintosh et al., 2012; Rihari-Thomas et al., 2017). These problems caused disjointed patient care, time inefficiencies, and poor patient management. Thus, while a primary team model may appear to address some of these issues during normal working hours, many of the same issues facing RRT models, also face primary team models after-hours. These issues need to be addressed in the development phase of any primary team response model.

It should also be noted that the use of a primary team model necessitates the additional need for an ICU-based MET. Where ICU based RRTs can provide the full range of patient treatment from non-critical care to critical care, this is not the case in primary team models. In such models, if a patient does not respond to the initiated therapy, an ICU MET referral and assessment may need to be made. Thus, the need for an ICU-based MET team ought to be included in any business case proposing a primary response team model.

A final system factor highlighted in this review influencing the successful implementation of a RRT was effective education surrounding the purpose, activation, and the actions of the RRT. The implementation of a new strategy such as a RRT requires a significant investment in educating those that will use it (Johnson, 2009; Smith & Welch, 2017). Issues highlighted in the studies under review indicate a lack of education, and therefore a lack of understanding surrounding the RRT. In order for the RRS to work effectively, this lack of appropriate education must be addressed.

The literature supports this review finding. Education that stresses the rationale and potential benefits of RRTs, and that frequently reminds staff that the RRT is available and effective has been found to improve patient outcomes (Jenkins, & Lindsey, 2010). In addition, RRT calls have been found to increase where nurses receive effective education and have a thorough understanding of the RRS (Jones, King, & Wilson, 2009). A recent systematic review reported that the use of educational programmes improved ward nurses recognition, escalation and review of patient deterioration (McGaughey et al., 2017). Researchers also stated that education programmes needed
to extend beyond teaching on early warning scores and response team calling criteria, to teaching staff how to intervene in a patient’s deterioration. Appropriate education is therefore pivotal, requiring ongoing organisation-wide campaigns to ensure the effectiveness of the RRT at responding to and intervening in patient deterioration.

Meta-synthesis 2: RRT Member Characteristics and Functions Leading to Success

Meta-synthesis two describes the characteristics and functions of RRT members that influence the effective implementation and management of RRTs. The studies included for review highlighted a variety of member characteristics and functions that influence RRT success. Favourable RRT member characteristics included advanced clinical knowledge and expertise; effective teamwork; and good communication skills. The RRT functions that influenced RRT success included building trust with ward staff through proactive rounding and educating and mentoring ward staff.

The advanced critical care knowledge and expertise of RRT members is crucial to the success of a RRT. This finding was clearly demonstrated in the reviewed studies and represented the attribute most favoured by ward nurses activating the RRT. Advanced knowledge and expertise was seen as foundational to the RRT’s role, and involved the ability to quickly assess the patient and make decisions regarding ongoing care (Leach & Mayo, 2013). This is hardly surprising considering the RRT fulfils the function of rescuer, providing expert assistance when ward staff are feeling out of their depth, or in need of critical care assistance (Leach, Mayo, & O’Rourke, 2010). Therefore, RRT members require more advanced critical care knowledge and expertise than the ward staff that requested their assistance. In a study previously cited which surveyed 39 RRTs in Australia, in 18% of cases, the RRT was not staffed by personnel with advanced airway skills. Additionally, researchers report that a senior ICU specialist only regularly attended RRT activations in one of the 39 RRTs surveyed (ANZICS-CORE MET dose Investigators, 2012). Using inexperienced clinicians who lack critical care knowledge and expertise to staff the RRT was a concern highlighted in this review (Rihari-Thomas et al., 2017). These findings underscore the importance of focused critical care education and training for RRT members.
The knowledge and skills required of RRT members remains a point of discussion. However, direction is provided in two documents that have relevance for New Zealand hospital response teams. A joint publication by the College of Intensive Care Medicine of Australia and New Zealand (CICM) and Australia and New Zealand Intensive Care Society (ANZICS) (2016) outlines the suggested advanced knowledge and skill set required by RRT members of ICU-based response teams. These include advanced airway and ventilation skills, the ability to manage cardiovascular instability and line insertion, and advanced patient assessment and monitoring skills. In order to maintain CICM accreditation, hospitals with ICU based RRTs are expected to adopt these or similar guidelines. More recently, the New Zealand Critical Care Outreach Forum, a group of New Zealand outreach nurse representatives, have been considering standardising New Zealand RRT services by adopting a UK developed document outlining standards and competencies for hospital outreach services. This document summarises a number of core elements required by RRTs, including the expertise expected of RRT members (The National Outreach Forum, 2012). These documents provide a benchmark for any New Zealand organisation considering implementing an acute care hospital RRT.

However, RRT members require more than just advanced clinical knowledge and expertise. The results of this review indicate that teamwork and team training are important determinants of RRT success. This conclusion is consistent with other findings reported in the literature. Teamwork has been identified as key to the successful management of medical emergencies involving multidisciplinary teams such as those utilised in many RRTs (Bristowe et al., 2012; Robertson et al., 2009). The skills inherently important in teamwork - communication, coordination, and cooperation - have been described as being “critical to patient safety in that they serve as barriers to error in patient care” (Rosen et al., 2008, p. 1191). In fact, teamwork skills may be as important a determinant of RRT success as advanced clinical knowledge and expertise. In a paper outlining the development of a training programme for RRT members, clinicians acknowledged that, “effective team communication and relationship skills are as important as critical care skills and would be crucial success factors in the implementation of these teams” (Cziraki et al., 2008, p. 67). This belief is supported by a study that analysed team behaviour during simulated emergencies (Siassakos et al., 2013). In this study, researchers found that
some teams were significantly better at managing emergencies than others, and this variation was related to their teamwork, rather than their individual knowledge or skill sets.

Team training programmes that utilise simulation show great promise, so it is little surprise that they are gaining increasing support within the RRS community. Simulation training has been shown to improve teamwork, leadership skills, and confidence when managing emergency events (Hamilton, Hunt, & DeVita, 2017). Such training may also be of significant benefit for RRTs. One notable example is found in a study that investigated the use of weekly simulation training for both MET members and senior ward staff in a tertiary paediatric hospital (Theilen et al., 2013). These researchers reported the implementation of simulation training was associated with improved recognition, escalation, response, and ultimately, improved patient outcomes for deteriorating patients with evolving critical illness (Theilen et al., 2013). As noted in the findings of this meta-synthesis, this type of team training has the additional benefit of building trust among team members as well as developing a shared and consistent team approach (Leach & Mayo, 2013). For these reasons, team-training strategies, such as simulation training, represent a vital aspect of any RRT staff education and development programme.

The way in which RRT members communicate with ward staff also has a significant impact on the success of the RRT. In this review, good communication was found to facilitate care of the deteriorating patient while negative communication and experiences with RRT members created a barrier to activation (Leach & Mayo, 2013; Massey et al., 2014). These findings are congruent with previous studies. Effective communication between hospital clinicians is crucial to ensuring both patient safety (Leonard, Graham, & Bonacum, 2004) and the success of the RRT (Cziraki et al., 2008; Odell, Mininni, & Goldsmith, 2017).

To ensure the effective handover of important clinical information, there is a growing movement toward the use of structured communication tools. The use of one of these tools, SBAR (Situation, Background, Assessment and Recommendation), was highlighted in this review as a facilitator of effective communication between the RRT and ward staff (Astroth et al., 2013). SBAR is increasingly being recommended
to optimise effective standardised communication within the healthcare setting (Dunsford, 2009; Compton et al., 2012; Randmaa, Martensson, Swenne, & Engstrom, 2014). Its simplicity and its ability to facilitate the rapid delivery of clear and concise clinical information, makes it a good choice for use between ward staff and RRT members. SBAR has now been shown to have a positive impact on patient safety in emergency situations in multiple studies (Woodhall, Vertacnik, & McLaughlin, 2008; Beckett, & Kipnis, 2009; Mackintosh & Sandall, 2010; Siassakos et al., 2011; De Meester, Verspuy, Monsieurs, & Van Bogaert, 2013). Within the author’s hospital, the Critical Care Steering Committee has already adopted SBAR as the communication tool of choice for hospital staff handing over clinical information. To date, a small amount of work has been undertaken to educate ward staff in its use, however it appears to be underutilised. Further education is required to ensure staff utilise this tool in the escalation of the deteriorating patient.

However, more is required of RRT members than simply utilising a standardised communication tool. Communication also encompasses the way in which we interact and support each other. In a study exploring the impact of RRTs in nine different hospitals in the United States, Donaldson et al. (2009) found that clear and consistent communication with an emphasis on supportive working relationships, characterised successful RRTs. This meta-synthesis highlighted the damaging impact of poor communication and the negative experiences that some ward staff have when interacting with RRT members. Studies reported ward nurses being fearful of RRT members, afraid of appearing stupid, and being reprimanded and questioned for perceived inappropriate RRT activation (Massey et al., 2014; Kitto et al., 2015). These negative experiences created a barrier to future RRT activations.

Examples of the negative reactions of RRT members toward ward staff and their effect on RRT success abound within the literature (Williams, Newman, Jones, & Woodard, 2010; Massey et al., 2016; Chua et al., 2017; Currey, Allen, & Jones, 2018). Fear of criticism from RRT members is one of the most commonly reported barriers to RRT activation (Jenkins, Astroth, & Woith, 2015). In a study conducted recently in a New Zealand hospital, ward nurses reported that one of the worst aspects of the PART related to poor communication and approachability, with one participant stating, “some need to be more friendly” (Wood et al., 2017, p. 4). Similar findings
were reported in a literature review that considered factors impacting nurses’ effective use of MET, where nine of the fifteen studies reviewed reported negative responses and behaviours deterring activation (Jones et al., 2009). Furthermore, Jensen and colleagues conducted a review of the impact of EWS and RRSs on nurse competence, and reported that the RRT members “at times reproaching behaviour…could complicate the referral process and discourage nurses from calling the RRS” (Jensen, Skar, & Tveit, 2018, p. 15).

Of particular interest in Jensen et al.’s (2018) review are the author’s comments that poor behaviour by the RRT was particularly evident when a patient’s EWS was low, and the nurse had called the RRT based on their clinical concern. They note that “to call for help without a high score to justify the call was more difficult and … may even have led to a delay in the detection of a patients deterioration.” (Jensen et al., 2018, p. 15). Williams et al. (2010) recounts the negative reaction of the RRT in similar circumstances reporting a RRT member saying to a ward nurse, “you called the rapid response team for this?” (p. 269). No matter how low the score, if a nurse is concerned for their patient, they should be encouraged to call the RRT. As demonstrated in chapter one, in at least 60% of cases, deterioration has been shown to be evident in the way a patient presents in the 6-24 hours before cardio-respiratory arrest (Buist et al., 1999; Hillman et al., 2002; Kause, et al., 2004). The aim of the RRS is the early recognition and intervention of this patient cohort. While patients with high EWSs will be easier for nurses to escalate due to their quantifiable deterioration, those with low scores about whom a nurse intuitively has concerns, may represent patients who are in the early stages of deterioration, and who will most readily respond to treatment. Therefore, the positive reaction of the RRT to these types of activations is crucial to the success of the RRS.

A “no-blame” culture in which every activation is valued and utilised, at the least as a teaching opportunity, must be fostered within the RRT (Massey et al., 2016). Ward staff who do not feel supported when they call the RRT are unlikely to call again (Jenkins et al. 2010). Additionally, negative interactions between the RRT and ward staff have a wider impact than discouraging only the ward nurse involved. In fact, “…disparaging comments made by [RRT] members live for a long time in the collective consciousness of the ward environment” (Robb & Seddon, 2010, p. 5). This
type of unprofessional behaviour is a patient safety issue in that it creates a barrier to the escalation of patient deterioration (Currey et al., 2018). Therefore, the way that RRT members communicate with ward staff, and the relationship they develop, will to a large extent dictate whether a hospital’s RRS succeeds or fails.

One way of fostering this positive relationship between ward staff and RRT members is through the use of proactive rounding. Proactive rounding was described in this review as a RRT function that built trust and developed relationships (Leach & Mayo, 2013; Smith & McSweeney, 2017). Proactive rounding describes the process of proactively visiting hospital wards to review high-risk patients, check in to see if ward staff have concerns about any patients, or in ICU-based teams, to review discharged ICU patients (Hueckel et al., 2008). Proactive rounding has shown mixed results in studies that have measured its effectiveness against quantitative outcome measures such as reduced ICU admissions or re-admissions, reduced cardiac arrests, and reduced hospital mortality. For example, an American study in a 700-bed hospital found that proactive rounding reduced cardiac arrests and hospital mortality, but increased ICU admissions (Guirgis et al., 2013). Conversely, in another American study with a similar design that investigated an ICU outreach team to see whether proactive rounding reduced ICU readmissions, ICU length of stay, and hospital mortality, researchers found no improved patient outcomes (Butcher, Vittinghoff, Maselli, & Auerbach, 2013).

However, the benefit of proactive rounding for ward staff is more obvious. As highlighted in this review, its advantage centres on the relationship that develops when ward staff have regular contact with RRT members. In a study that investigated causes of failure to rescue, researchers found that the most important factor in deciding whether ward staff escalated care was previously developed rapport with those who attended the call (Johnston, Arora, King, Stroman, & Darzi, 2014). Similarly, in a review considering factors that influence ward nurses’ recognition and response to patient deterioration, researchers found that “nurses were better positioned to respond to patient deterioration when they knew and trusted the team they were working with.” (Massey et al., 2016, p.19). The use of proactive rounding to build this trust and improve the collegial relationships between ward staff and the RRT has the potential to influence the success of the RRT.
The final key function of the RRT to be discussed is the importance of ward staff education. The findings of this review indicate that RRT members are seen as coaches, mentors, and educators for ward staff (Astroth et al., 2013; Benin et al., 2012; Smith & McSweeney, 2017). This is consistent with previous studies and other RRT literature. The importance of educating ward staff about the recognition, escalation, and treatment of the deteriorating patient cannot be overstated. In a study that considered the immediate and long-term impact of a MET, researchers found that the effectiveness of the RRS decreased over time (Campello et al., 2009). The authors noted that the initial success of the programme was likely related to the extensive hospital-wide staff education conducted at implementation. They conclude that the long-term effectiveness of the RRS may be intrinsically linked to the continued critical-care education of all ward staff.

RRT members have an important role to play in the delivery of this critical care knowledge to ward staff (Smith & Welch, 2017). In fact, this teaching role is often seen as a core function of the RRT (Athifa et al., 2011). Murray and Kleinpell (2006) describe an example of an RRT that concentrated on this type of teaching. In their example, team members focused on teaching and mentoring ward staff rather than intervening during RRT calls. The goal of their RRT was “…to give away critical care skills so as to enhance the clinical decision-making and assessment skills of the floor RN” (Murray & Kleinpell, 2006, p. 495). In this case, RRT members transferred critical care knowledge to the ward nurse by deliberately thinking aloud and articulating their patient assessment and the integration of clinical cues that led to the conclusions drawn. Similarly, Jensen et al. (2018) found that the transfer of critical care knowledge between RRT members and ward staff occurred at the patient’s bedside when RRT members explained their actions. Teaching RRT members to articulate their thinking at the bedside appears to be an effective way of improving the ability of ward staff to provide effective care when they next are presented with a deteriorating patient.

The beneficial effects of debriefing were also highlighted in this review, where RRT members returned to the ward several hours after the RRT event to review the RRT activation with the ward staff member concerned (Astroth et al., 2013; Smith &
McSweeney, 2017). This finding is congruent with previous studies. In a study exploring the benefits of RRTs, the beneficial impact of debriefing was reportedly evidenced in the ability of ward staff to anticipate and prepare for the arrival of RRT members on subsequent activations (Stolldorf, 2016). In addition, Jenkins and Lindsey (2010) describe the benefit of using clinical nurse specialists to routinely discuss RRT calls with the nurses involved after the event. They report that this debriefing enabled nurses to “recognise the signs of clinical deterioration that led to the call [and] review the actions taken to stabilise the patient during the call” (Jenkins & Lindsey, 2010, p. 29). The use of bedside education and debriefing methods such as this represents an important tool in the arsenal of the successful RRT.

**Discussion Summary**

This review has highlighted some of the factors that influence the effective implementation and management of a RRT. The system factors highlighted in this review have illustrated the importance of hospital-wide collaboration in the development phase of any RRS. Managerial support is required to ensure the ongoing governance, investment in technology, and adequate resourcing that is essential to the long-term success of the RRT. In addition, skilful navigation of the complex relationship between the RRT and primary ward teams is key to the effectiveness of any RRT.

Finally, key characteristics and functions of RRT members have also been highlighted within this review. It is clear that RRT members require an advanced level of clinical expertise, the ability to work within a team, and the capacity to facilitate, rather than take over, from ward staff in the care of a deteriorating patient. Perhaps most importantly, RRT members require the ability to foster positive relationships with the ward staff they are called to assist. A team that can combine these factors in the implementation and management of their RRT is moving forward on the path to success.
Chapter 5. Conclusions

Implications for Practice

Following the critical appraisal process, the reviewed studies were all judged to be of a high methodological quality. Therefore, the findings outlined in this review and the resulting meta-syntheses can be used as credible evidence to inform practice-based recommendations. There are five practice recommendations derived from this review that are presented under the headings of the two review meta-syntheses.

Meta-synthesis One: System Factor Recommendations

Meta-synthesis one includes three recommendations relating to system factors that have been shown to positively influence the implementation and management of RRTs.

1. Organisational Support

Organisational support and commitment to the RRS are pivotal to the successful implementation and management of a RRT. This support needs to be wide-ranging and ongoing, coming from hospital managers and leaders, through to the senior nursing and medical clinicians working on the wards.

Organisation-wide support involves promoting a hospital-wide culture of safety whereby RRS initiatives are actively endorsed. This should include support from hospital managers and leaders to ensure the RRT receives adequate resourcing. In the case of the author’s place of employment, a tertiary level hospital, this would likely require resourcing for a 24-hour-a-day, seven-day-a-week service.

In addition, unqualified endorsement for ward staff activating the RRT, is also instrumental to the success of a RRS. Encouraging senior ward staff to promote a “no-blame” culture that empowers junior nurses and doctors to
make timely and appropriate activations of the RRT is vitally important to the success of the RRT - and ultimately patient safety.

Finally, an ongoing organisation-wide education campaign that stresses the rationale and benefits of RRTs, and that frequently reminds staff that the RRT is available and effective, will ensure the success of the RRT at responding and intervening in patient deterioration.

2. Investment in Technology & Innovation
The use of technology and innovative ways of care delivery are important factors leading to RRT success. Utilising electronic technology in the recognition and escalation of deteriorating patients has been associated with a significant reduction in patient mortality (Schmidt et al., 2014; Subbe et al., 2017). Hospital organisations should invest in electronic systems that record vital signs; total early warning scores; incorporate laboratory results and other pertinent clinical results; and automatically notify interested parties of aberrant results. Equally, hospital leaders should encourage the development of innovative programmes to proactively treat at-risk patient groups.

However, hospital leaders need to ensure ward staff receive education to safeguard against the over-reliance on automated vital sign monitoring that can lead to nurses being less vigilant to patient deterioration and delays in RRT activation.

3. Primary Team Involvement
Multiple problems were highlighted in this review relating to the relationship between the RRT and primary medical team. While some of these difficulties may be addressed by implementing a primary team model, similar issues face such models afterhours or when the primary team is under-resourced. These relationship hurdles may be mitigated by undertaking hospital-wide consultation and involving all medical subspecialties in the development phase of the RRT. Obtaining primary team support, and developing a RRS that
addresses the team’s concerns, will go a long way toward ensuring the success of the RRT.

Some of the specific issues highlighted in this review include resistance against activating the RRT before calling the primary medical team, and concern over the de-skilling of ward staff. Both of these issues can be addressed by designing a RRS that concurrently activates the RRT and the primary medical team, and ensures that the RRT facilitates primary team care, rather than intervening on their behalf.

Additionally, if a primary team model is chosen, in order to adequately care for those patients who go on to require ICU input, an ICU-based MET should be included in the business case.

**Meta-synthesis Two: RRT Member Characteristics & Functions Recommendations**

Meta-synthesis two includes two recommendations related to RRT member characteristics and functions that enable RRT success.

1. **RRT Member Characteristics**

   A number of RRT member characteristics were highlighted in this review as being crucial to the effective implementation and management of a RRT. Firstly, RRT members require advanced critical care knowledge and expertise, exceeding that of the ward staff that request their assistance. While the specific expertise required remains a point of discussion, this review has highlighted two documents relevant to the New Zealand response team community that provide guidance in this regard (see page 66 above).

   Secondly, RRT members require the ability to work effectively within a team. Teamwork and team training are key to the success of the RRT. Team-training strategies such as simulation training represent a vital aspect of any RRT staff education and development programme. Such team education
needs to be ongoing, as it is important for skill acquisition, ability to work in a team, and the development of a consistent approach among team members.

Finally, RRT members require effective communication skills. The way in which RRT members communicate with ward staff will, to a large extent, dictate whether a hospital’s RRS succeeds or fails. Therefore, the importance of effective communication cannot be overstated. The use of standardised, structured communication tools such as SBAR have been shown to facilitate effective communication between the RRT and ward staff. SBAR has already been implemented at the author’s place of employment, however, it is under-utilised, and further hospital-wide education is required to ensure its use in the escalation of the deteriorating patient.

However, effective communication also encompasses the manner in which we interact and support each other, as well as the information relayed. Therefore, it is imperative RRT members show mutual respect in the manner in which they interact with ward staff.

2. RRT Member Functions

Two functions of RRT members were highlighted as aspects that influenced the effective implementation and management of RRTs. The first was the bedside education and mentoring that RRT members conducted with ward staff. The teaching role is a core function of the RRT, and RRT members should be coaches, mentors, and educators for ward staff. This teaching function should be included in the role description provided when advertising for new RRT members.

Two teaching techniques were discussed in this review. Firstly, instructing RRT members to articulate their thinking at the bedside appeared to be an effective way of improving the ability of ward staff to provide effective care when they were next presented with a deteriorating patient. Secondly, the use of debriefing was shown to be effective, whereby RRT members returned to discuss an activation from earlier in the day with the ward staff concerned.
The second function that influences RRT success is proactive rounding. Proactive rounding describes the process of visiting hospital wards to review high-risk patients, check in to see if ward staff have concerns about any patients, and review discharged ICU patients. While quantitative measures appear inconclusive regarding the effectiveness of proactive rounding in terms of patient outcomes, the findings of the qualitative research are clear: it builds trust and improves collegial relationships between ward staff and the RRT. For this reason, proactive rounding should be incorporated into the daily schedule for RRT members.

These five recommendations represent factors that have the potential to positively influence the success of the RRT. Due to the fact that the author’s place of employment is currently in the development phase of a response team, these recommendations are timely, as there is no better time to get the design right than in the design phase. While the ongoing review of any implemented practice recommendations is essential, it would be beneficial to use this evidence-based research to inform the implementation and management of our deteriorating patient response team.

**Recommendations for Research**

The findings of this review highlight the need for further research in a number of areas. To date, studies reviewing response team effectiveness have included all models of response: RRTs, METs, CCOTs, and PART. While the principle underlying these teams is similar, variations such as staff composition and hospital culture may influence the perceptions of the healthcare professionals utilising them, therefore affecting results. Reviews that focus on similarly structured response teams, such as METs only, may better highlight the effects of different models of response and enable improved specificity in the development of policy and practice recommendations.
While there are multiple studies considering healthcare clinicians and administrator perspectives of RRTs, the patient or family perspective appears largely absent. A number of studies and reviews are now appearing investigating the use of patient and family escalation as part of a RRS, however, these studies focus on the patient or family role in the escalation process rather than on their experience of RRTs. Results from studies that consider the impact of RRT involvement on patients and their families may prove beneficial both for those developing and implementing RRTs and the staff that make up these teams.

Much of the research utilised in this review was conducted outside of New Zealand, and therefore in health systems different to our own. This may affect the generalisability of results. Here in New Zealand, the recent implementation of a nationwide NZEWS and RRS has meant that opportunities will increasingly be available to study response team effectiveness. Opportunities to conduct before-and-after studies, and qualitative research that investigate the impact that this national programme has on hospital institutions, healthcare clinicians and patients will be abundant. Researchers should take these opportunities to gather local contextual information that enable hospitals within New Zealand to develop best-practice evidence and guidelines to shape our national RRS in years to come.

**Limitations of the Review**

This review has a number of limitations. Firstly, the restrictions utilised in the search strategy may represent a limiting factor for this review. These included restricting eligible research to articles published after the year 2000; to those that were written in English; and to those that had full text available. These search strategy limitations may have meant relevant articles were not included that may have added to the review findings.

Secondly, the studies included in this review investigated different models of response team. The majority considered RRTs, however, a number also considered CCOTs or METs. While these teams largely carry out similar functions, factors such as the variation in staff composition, differences in resourcing, or hospital cultural
diversity represent heterogeneity that may have influenced this review’s results. However, this diversity may also represent a strength, in that the review has obtained healthcare professionals’ views on multiple response team models. Thus, review results may more readily be generalised and used to inform response team practice direction.

Finally, the subjectivity of the researcher may represent a potential limitation. Other than during quality appraisal where two researchers evaluated each article chosen for review, one researcher carried out the review search, data extraction, and meta-synthesis. Thus, the bias of the researcher may have influenced the findings in this review.

**Conclusion**

RRTs have become the approach of choice in responding to clinical deterioration in many hospitals worldwide. The New Zealand Health Quality and Safety Commissions programme to implement a nationwide RRS has led to RRTs being developed and implemented in many New Zealand hospitals. The author’s place of employment is currently considering how best to respond to deteriorating ward patients and the form this response will take.

This review was undertaken in order to consult the research to inform the development of a successful RRT within our hospital. Several quantitative reviews had been conducted that indicated RRTs save patient lives. However, multiple variables exist between hospitals where quantitative RRT studies have been conducted, and there is a growing awareness among healthcare clinicians, that these variables may have a major impact on RRT success. A growing body of qualitative research is being conducted to investigate these factors by examining healthcare professionals’ experiences of RRTs. The purpose of this review was to look at this qualitative research to determine some of the factors that influence the effective implementation and management of RRTs within acute care hospitals. To the best of the author’s knowledge, this is the first review to do so.
Using a meta-aggregative process, this qualitative review incorporated a systematic approach to meta-synthesis generating five practice-based recommendations. Three of these recommendations describe system factors that can influence the success of the RRT. These include ensuring organisation-wide support for the RRS and the development of a culture of safety, ongoing investment in technology and innovation relating to patient deterioration, and enlisting primary medical team support in the development of a RRS service. Two recommendations describe the characteristics and functions of RRT members that can influence the success of the RRT. The characteristics of RRT members include advanced clinical expertise, the ability to work successfully in a team, and effective communication. The functions recommended include bedside teaching and mentoring of ward staff, and the use of proactive rounding to visit at-risk patients and build trust with ward staff.

These five recommendations represent factors that have the potential to positively influence the success of RRTs. It is hoped that this review and the practice recommendations in particular will assist in the successful implementation and management of a RRT within the author’s hospital.
References


Hannes, K., & Pearson, A. (2012). Obstacles to the implementation of evidence based practice in Belgium: a worked example of meta-aggregation. In K. Hannes, and C. Lockwood (Eds.), *Synthesizing qualitative research: choosing the right approach*. Retrieved from Wiley Online Library


Mackintosh, N., & Sandall, J. (2010). Overcoming gendered and professional hierarchies in order to facilitate escalation of care in emergency situations: the role of standardised communication protocols. *Social Science & Medicine, 71*(9), 1683-1686. doi.org/10.1016/j.socscimed.2010.07.037


Shapiro, S. E., Donaldson, N. E., & Scott, M. B. (2010). Rapid response teams seen through the eyes of the nurse. *AJN The American Journal of Nursing, 110*(6), 28-34. doi: 10.1097/01.NAJ.0000377686.64479.84


Appendices

Appendix A: PICo Framework with Inclusion Criteria

**Review Question**

What factors influence the effective implementation and management of a RRT?

<table>
<thead>
<tr>
<th>Table 1: PICo</th>
<th>Inclusion Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td>- Hospital based healthcare professionals</td>
</tr>
<tr>
<td></td>
<td>- Healthcare professionals involved in in-patient care - e.g. Doctors, Nurses, &amp; Allied Health</td>
</tr>
<tr>
<td><strong>Phenomena of Interest</strong></td>
<td>- Healthcare professionals experiences of factors that influence the effective implementation of RRTs</td>
</tr>
<tr>
<td></td>
<td>- Studies considering healthcare professionals experiences of factors affecting effective RRT implementation and management</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td>- Hospitals – Secondary &amp; Tertiary level</td>
</tr>
<tr>
<td></td>
<td>- Worldwide</td>
</tr>
<tr>
<td></td>
<td>- Health professionals working in secondary and tertiary health systems</td>
</tr>
<tr>
<td><strong>Study Design</strong></td>
<td>- Primary research that reports qualitative data</td>
</tr>
<tr>
<td></td>
<td>- Qualitative Primary Research</td>
</tr>
<tr>
<td></td>
<td>- Primarily Published</td>
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<td></td>
<td>- English</td>
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<td></td>
<td>- Full Text Available</td>
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<td></td>
<td>- Post 2000</td>
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### Table 1: Key Words and Synonyms to Guide Database Search – PICO format

<table>
<thead>
<tr>
<th>Population</th>
<th>Experiences or perception of:</th>
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<tbody>
<tr>
<td></td>
<td>- Healthcare professional</td>
</tr>
<tr>
<td></td>
<td>- Healthcare clinician</td>
</tr>
<tr>
<td></td>
<td>- Healthcare personnel</td>
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<td>- Doctor</td>
</tr>
<tr>
<td></td>
<td>- Physician</td>
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<td></td>
<td>- Nurs*</td>
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<table>
<thead>
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<th>Phenomena of Interest</th>
<th>Implementation of Management of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Rapid Response Teams</td>
</tr>
<tr>
<td></td>
<td>- Critical Care Outreach Team</td>
</tr>
<tr>
<td></td>
<td>- Patient At Risk Team</td>
</tr>
<tr>
<td></td>
<td>- Medical Emergency Team</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Context</th>
<th>- Hospital*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Inpatient*</td>
</tr>
<tr>
<td></td>
<td>- Hospital patients</td>
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</tbody>
</table>

| Study Design | - Qualitative |

### Table 2: An Example of each Database’ Search String

<table>
<thead>
<tr>
<th>Date</th>
<th>Database</th>
<th>Search String &amp; Key Words</th>
</tr>
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<tbody>
<tr>
<td>02.07.2018</td>
<td>CINAHL</td>
<td>Search ((((((rapid response team) OR critical care outreach team) OR medical emergency team) OR patient at risk team)) AND ((((((healthcare professional) OR healthcare personnel) OR healthcare clinician) OR doctor) OR nurse) OR physician) OR hospital staff)) AND (((inpatient) OR hospital patient) OR secondary care) OR tertiary care) AND</td>
</tr>
<tr>
<td>Date</td>
<td>Source</td>
<td>Query</td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>02.07.2018</td>
<td>Pubmed</td>
<td>((((((rapid response team) OR medical emergency team) OR critical care outreach team) OR patient at risk team)) AND (((((healthcare personnel) OR healthcare professional) OR physician) OR doctor) OR nurse)) AND ((experience) OR perception)) AND ((implementation) OR management)</td>
</tr>
<tr>
<td>07.07.2018</td>
<td>Google Scholar</td>
<td>(&quot;rapid response team*&quot; OR &quot;critical care outreach team*&quot; OR &quot;medical emergency team*&quot; OR &quot;patient at risk team*&quot;) (qualitative experience OR qualitative perception) (implementation OR management) factors</td>
</tr>
</tbody>
</table>
Appendix C: Search Strategy

Table 1: Strategy for Literature Search & Identification of Relevant Studies

<table>
<thead>
<tr>
<th>Data base</th>
<th>Total Articles</th>
<th>Articles remaining after title review</th>
<th>Articles remaining after abstract review &amp; removal of double ups</th>
<th>Articles remaining after exclusion criteria</th>
<th>Final articles after critical appraisal</th>
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<td>3</td>
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<tr>
<td>Pubmed</td>
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<td>3</td>
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<td>16</td>
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# Appendix D: JBI Quality Appraisal Checklist

## JBI Critical Appraisal Checklist for Qualitative Research

Reviewers: ___________________________ Date: ___________________________

Author: ___________________________ Year: __________ Record Number: ________

<table>
<thead>
<tr>
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<th>Yes</th>
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<th>Not applicable</th>
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<tbody>
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<td>9.</td>
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</tr>
<tr>
<td>10.</td>
<td></td>
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<td></td>
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</tbody>
</table>

Overall appraisal: Include [ ] Exclude [ ] Seek further info [ ]

Comments (including reason for exclusion):

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Appendix E: JBI's Data Extraction & Findings Forms

Figure 1: Data Extraction form

<table>
<thead>
<tr>
<th>JBI QARI Data Extraction Form for Interpretive &amp; Critical Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reviewer</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Title</td>
</tr>
<tr>
<td>Author</td>
</tr>
<tr>
<td>Year</td>
</tr>
<tr>
<td>Journal</td>
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</table>

STUDY DESCRIPTION

Methodology

Method

Phenomena of Interest

Setting

Geographical

Cultural

Participants

Data Analysis

Authors Conclusions

Comments

Complete | Yes | No

Figure 2: Findings Form

<table>
<thead>
<tr>
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</table>

<table>
<thead>
<tr>
<th>FINDING</th>
<th>PAGE NUMBER</th>
<th>EVIDENCE</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Unequivocal</td>
</tr>
<tr>
<td>Study</td>
<td>Methods</td>
<td>Participants &amp; Setting</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Astroth et al. (2013)</td>
<td>Convenience purposive sampling;</td>
<td>15 Nurses who had activated the RRT from three medical/surgical units in a 155-bed</td>
</tr>
<tr>
<td></td>
<td>interviews; semi-structured</td>
<td>Midwestern community hospital, USA</td>
</tr>
<tr>
<td></td>
<td>open-ended questions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baker-McClearn et al.</td>
<td>Stratified purposeful sample;</td>
<td>100 healthcare workers: Nurses, Student Nurses &amp; HCAs, Junior &amp; Senior Doctors, Allied</td>
</tr>
<tr>
<td>(2008)</td>
<td>Semi-structured interviews</td>
<td>Health Professionals, Managers: from a selection of 8 hospitals in the UK NHS</td>
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<tr>
<td>Benin et al. (2012)</td>
<td>Purposeful sampling; open-ended</td>
<td>49 participants; 18 RNs, 8 administrators, 6 primary team senior attending physicians,</td>
</tr>
<tr>
<td></td>
<td>interviews (single/private)</td>
<td>6 house staff members, 4 RRT attending physicians, 4 RRT nurses, 3 RRT respiratory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>technicians from a single hospital within the USA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Methods</td>
<td>Participants &amp; Setting</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Jeddian et al.         | Convenience purposive sampling; focus group discussions | 24 participants including CCOT members, ward nurses, physicians from a single tertiary hospital in Iran | Explore hospital staff perceptions of the challenges and outcomes of implementing a critical care outreach service | Two main categories described the challenges to the implementation of the critical care outreach service: 1) The hospital context 2) Staff resistance. There were other subcategories and also positive and negative perceived outcomes | Setting is an Iranian hospital and cultural issues are highlighted such as the doctor nurse hierarchy & end-of-life decision making  
- Study is robust and methodology rigorous                                                                 |
| Kitto et al. (2015)    | Junior nurses through snowball sampling. Senior doctors were recruited via email sent to program heads to nominate participants; focus groups | 27 doctors, 62 nurses at four our hospitals in Australia                                | This study examines participants’ experiences of the RRS in addition to exploring social and cultural factors that mediate the usage of the RRS. | Reasons for not activating the RRS included: distinct intraprofessional clinical decision-making pathways; a highly hierarchical pathway in nursing, and a more autonomous pathway in medicine; and interprofessional communication barriers between nursing and medicine when deciding to make and actually making a RRS call. Participants also characterized the RRS as a work-around tool that is utilized when health professionals encounter problematic interprofessional communication. | Discussion is regarding RRS activation – not specifically about RRT implementation and management. But information is particularly relevant to my review question  
- A lot about communication between nurses and doctors  
- Importance of different arm in making the RRT work                                                                 |
<p>| Leach et al. (2013)    | Purposive sampling; in person semi-structured interviews; Convenience sampling of nine observational events | 17 total: ward nurses, RRT nurses, physicians, administrators including heads of respiratory therapy, nursing and medicine; A public tertiary care hospital in USA | To describe the effectiveness of RRTs in a large teaching. | Professionals reported rapid response teams functioned well in managing patients at risk or in crisis; unique challenges were identified. Teams were loosely coupled because of the inconsistency of team members from day to day. Team members had little opportunity to develop relationships or team skills. Communication between team members and managing a crisis were critical aspects of an effective response team. | Good study, methodology well described, good discussion with practice implication section            |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Methods</th>
<th>Participants &amp; Setting</th>
<th>Intervention</th>
<th>Outcomes</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Mackintosh et al. (2012)  | Data collection and analysis was guided by ethnographic methods. It involved 150 hours of observation, and 35 semi-structured individual interviews and documentary review and analysis of routine data. | 35 interviews with doctors, ward and critical care nurses, healthcare assistants, safety leads and managers; the medical directorate of two tertiary UK NHS teaching hospitals. | Exploration of the RRS used in the management of escalation in two large tertiary care hospitals in the UK looking at what works in what circumstances and why | The findings highlight the importance of organisational structures and constraints, including issues of legitimacy and power that need to be addressed in RRSs | - Some really good data relevant to my review question  
- Looks at all aspects of the RRS, so there is a lot that is not relevant  
- Seems overall well designed and well reported in their article |
| Massey et al. (2013)      | Researchers looked at new admissions in the ICU each morning, and followed up acute MET admissions. Nurses who had looked after these patients and called the MET were asked to participate—a consecutive sample. | 15 ward nurses who had cared for patients who had ended up in ICU following a MET call in a large public teaching hospital with a well established MET in Australia | Exploration of nurses’ experiences and perceptions of using and activating a MET, in order to understand the facilitators and barriers to nurse’s use of the MET | Four themes: sensing clinical deterioration; resisting and hesitating; pushing the button; and leadership and support. This research identified why nurses do not activate METs appropriately and provides some good recommendations | - Well constructed study and article write-up  
- Small sample size, and nurse respondents only  
- Focuses on barriers to calling the MET, but this has interesting implications for factors influencing effective implementation and management of a RRT |
| Rihari-Thomas et al. (2017)| Purposive sampling; 6 focus groups – 4 discipline specific, 2 multidisciplinary. | 34 health professionals (21 physicians, 13 RNs) in an Australian Hospital | To ascertain factors that influence implementation and ongoing effective use of RRS & clinicians perceptions of its efficacy and utility when the initial tier of medical response is led by the patients admitting team | RRS is good, but some discrepancies and weaknesses existing in the system..."The study adds to an emerging body of data emphasising the importance of considering local, contextual factors, as well as model elements. Workplace processes, cultural and professional factors and systems are important...Failing to consider teamwork communication and inter-professional dynamics impede activation of critical elements of the RRS | - Some really good information relevant to my review question  
- Only states the overall methodology as being qualitative. |
<table>
<thead>
<tr>
<th>Study</th>
<th>Methods</th>
<th>Participants &amp; Setting</th>
<th>Intervention</th>
<th>Outcomes</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shapiro et al. (2010)</td>
<td>Nurse leaders at the randomly chosen hospitals invited nurses who had participated in at least one RRT activation to attend the semi-structured focus group interviews.</td>
<td>56 staff nurses from 18 hospitals. These nurses worked in various settings in hospitals that averaged 346 beds (range between 72 to 910 beds). Staff from 18 hospitals in 13 states in the USA.</td>
<td></td>
<td>In hospitals that had good examples of RRTs, staff were aware of and readily activated the RRT. This had the full support of the critical care nurses, physicians, and others who respond as team members. In these hospitals, nurses didn’t feel left on their own. The presence of the RRT both enhances the nurses’ work environment and helps them provide better patient care.</td>
<td>- This was part of a mixed methods study. So just the qualitative study discussed. - Some good info, and relevant to the review question</td>
</tr>
<tr>
<td>Smith et al. (2017)</td>
<td>Purposive sampling as well as snowball sampling. Individual interviews</td>
<td>27 – nurses and medical executives from 15 hospitals in 5 states in the USA.</td>
<td></td>
<td>Currently there is a lack of evidence-based guidance to help organisations implement and monitor RRT development. Organisations must evaluate resource management in making decisions about RRT structure and function... and understanding cost and cost offset associated with an RRT is important in allocating resources in a health care organisation.</td>
<td>- Interesting getting nursing leaders opinions/experience - Not heaps of participant quotes</td>
</tr>
</tbody>
</table>
JBI QARI Data Extraction Form for Interpretive & Critical Research

Reviewer  | Rod  
---|--- 
Date | 10.07.18  
Title | Nurses’ perceptions of accessing a Medical Emergency Team: a qualitative study  
Author | Massey, Chaboyer, Aitken  
Year | 2014  
Journal | Australian Critical Care  

STUDY DESCRIPTION

Methodology
Interpretive qualitative approach

Method
Researchers looked at new admissions in the ICU each morning, and followed up acute MET admissions. Nurses who had looked after these patients and called the MET were asked to participate – a consecutive sample.

Phenomena of Interest
To explore nurses’ experiences and perceptions of using and activating a MET, in order to understand the facilitators and barriers to nurse’s use of the MET.

Setting
A large public teaching hospital with a well established MET

Geographical
Queensland, Australia

Cultural
Not specified

Participants
15 ward nurses who had cared for patients who had ended up in ICU following a MET call.

Data Analysis
Inductive approach to thematic analysis. Conceptual, iterative theme development until data saturation (no new themes found).

Authors Conclusions
Four themes: sensing clinical deterioration; resisting and hesitating; pushing the
button; and leadership and support.
This research identified why nurses do not activate METs appropriately and provides some good recommendations. Delay in activation exposes patients to suboptimal care and increases the risk of adverse events.

**Comments**
- Well constructed study and article write-up
- Small sample size, and nurse respondents only
- Focuses on barriers to calling the MET, but this has interesting implications for factors influencing effective implementation and management of a RRT

<table>
<thead>
<tr>
<th>Complete</th>
<th>Yes</th>
<th>✓</th>
<th>No</th>
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</thead>
</table>

August 14th 2018

<table>
<thead>
<tr>
<th>Finding</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resisting and hesitating activating the RRT due to fear of looking stupid or being reprimanded or through fear of the RRT through previous bad experiences (U) (Massey, 2014)</td>
<td>✓</td>
</tr>
</tbody>
</table>

“Participants said, “I don’t know if it would be the right thing to do”, “I don’t want to look like an idiot”, and ‘I may get into trouble’. Participants admitted that they resisted or hesitated before activating a MET because they were anxious or frightened about the consequences and the panic that would ensue following the arrival of a response team. Participants identified that they were “scared of the MET” and scared of the feelings that the MET evoked in them.” (Study Authors extract with participants quotes italicized, p. 135).

“Maybe questioning my decisions: Am I over-reacting here? Is this real or am I just panicking? So just questioning my ability or my reality around what’s happening. Just not having enough experience. Just feeling I’d better not do that kind of thing or I might get told off.” (Tanya) (p. 135)

The fear of “being reprimanded”, “looking like an idiot”, or “being told off” was a powerful motivator that participants used to justify delaying activating the MET. Mary said:

“Nurses feel like they are going to be told off for wasting the medical emergency team’s time. Even though worried or concerned is on the little cards that we all carry around. That message has not been embraced by the nursing staff because people are still frightened I think. Talking to people they still think they are going to get told off or there are going to be repercussions.” (Mary) (p. 135)

“Participants spoke about being reprimanded by members of the MET during previous MET calls. This experience created negative feelings and emotions for participants, who clearly wishing to avoid these negative emotions created certain coping responses. These responses included resisting the MET and hesitating in activating a MET. Both responses may
have led to a delay in escalating care for the deteriorating ward patient and acted as a significant barrier to MET activation. (Study Authors comment, p. 135)

<table>
<thead>
<tr>
<th>Misunderstanding surrounding the purpose of RRT and role in preventing deterioration a barrier to activation (U) (Massey, 2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I think it’s probably a lack of understanding of the MET and how it should be used. People don’t see it as an early intervention thing; I am not sure how you go about changing that. I can see that the patient is deteriorating and I can see that poor decisions are being made and it’s very frustrating, yet a MET is not called because the patient is not sick enough for a MET; it’s amazing.” (Katie) (p.136)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participants difficulty separating the functions of the RRT from the arrest team (U) (Massey, 2014)</th>
</tr>
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<tbody>
<tr>
<td>“It would depend if I thought the patient could, I don’t know, hang on a few more minutes until people got there. But if I didn’t think I was going to get a quick response, I wouldn’t. I’d just do it; I’d push the button.” (Helen) (p. 136)</td>
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<td>“If it’s a MET call, you go to the nurse in-charge. If it’s an arrest, I push the button and then it’s real because our buzzers call out at the time and everybody comes.” (Tanya) (p. 136)</td>
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<tr>
<th>Lack of organised approach to RRT calls make ward staff less likely to activate a RRT in future (C) (Massey, 2014)</th>
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<td>“I think if a clear leader is designated to manage and lead the code or the MET call that would be a big improvement. At the moment, it is chaotic and can be uncoordinated and that adds to an already stressful event.” (Tanya) (p. 136)</td>
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<th>Potential delay to RRT activation through seeking support from senior ward team members to validate clinical decisions and actions (U) (Massey, 2014)</th>
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<td>“The participants talked frequently about “going to the nurse in charge first”. This effectively bypassed the MET and prevented its use as an early intervention strategy” (Study Author comment with participant quotes italicized, p. 136)</td>
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<tr>
<td>“Yeah, I think if I was concerned about someone in the first instance and it wasn’t—what’s the word?—critical, I’d certainly consult with the person in-charge and say, ‘Look, I’ve got Mr. Jones over here and I really don’t think he’s doing well. His blood pressure has dropped a little bit and he looks a bit grey looking, he seems to be sort of deteriorating slowly but seems relatively stable. Can you come and review him at some point? But then that could be, it could be 10 min time or it could be 3 h. I would still talk to the person in-charge first perhaps before we got to the decision-making of a MET call.” (Rachel) (p. 136)</td>
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