NURSES ROLE IN RECOGNISING AND RESPONDING TO CLINICAL DETERIORATION

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Abstract

Keywords: Decision making, Postoperative nursing, postoperative sequelae, quality and safety, surgical nursing, critical incidents.

Background: Clinical deterioration is a significant problem in acute care settings. Nurses play a vital role in postoperative patient monitoring, however, there is limited understanding of the nurses' role in recognising and responding to clinical deterioration in surgical patients.

Aim: To explore nurse' role in recognising and responding to deteriorating postoperative patients.

Methods: This qualitative exploratory study was conducted at a metropolitan teaching hospital in Melbourne, Australia. Data were collected through focus groups from 1 September to 31 October 2014. Four focus groups of 2 to 5 surgical nurses (n=14) were conducted to explore the nurses' perception of their role in managing deterioration over the first 72 hours postoperatively. Qualitative data were recorded, transcribed and key themes identified.

Results: Nurses demonstrated a high level of awareness of their role in recognising and responding to early signs of deterioration. The themes that arose from the focus group interviews
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were “struggling with blood pressure”, and “we know our patient is sick”. The nurses were confident about the clinical indicators of deterioration and the appropriate channels to use to escalate care. Using track and trigger observation charts enabled nurses to identify deteriorating patients prior to the patient fulfilling rapid response system escalation criteria.

Relevance to clinical practice: Nurses working in acute surgical wards are highly engaged in the process of recognising and responding to clinical deterioration in postoperative patients. Many nurses reported being able to anticipate deterioration occurring but are required by current organisational frameworks to escalate care to rapid response systems. How nurses anticipate and manage deterioration prior to the patient fulfilling rapid response system criteria warrants further investigation.

What does the paper contribute to the wider global clinical community?

- This study adds to the understanding of nurses’ role in recognising and responding to clinical deterioration in surgical patients postoperatively.
- This study demonstrated the surgical nurses were confident about their clinical assessment skills, recognition of the deteriorating patient and understanding of when to escalate and consistently escalated care based on objective physiological parameters.
- In the early postoperative period, nurses reported that the most common form of deterioration they had to manage was hypotension.

INTRODUCTION

Over the past 15 years, introduction of proactive systems to ensure early recognition and effective management of clinical deterioration have become an integral part of acute health care (Jones, DeVita & Bellomo 2011). Rapid Response Systems (RRS) were based on the premise that patient outcomes could be improved if high mortality events such as in-hospital cardiac arrest and unplanned intensive care unit admissions could be prevented through early recognition

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and response to clinical deterioration (Bellomo et al. 2003; Buist, Bernard, Nguyen, Moore & Anderson 2004; Jones, Bellomo & DeVita 2009). Most RRS research has however focused on patient outcomes (Chan, Jain, Nallmothu, Berg, Sasson 2009; Winters et al. 2007) or the interventions provided by the Medical Emergency Team (MET) (Topple et al. 2015) rather than the clinical staff who are responsible for RRS activation. In this qualitative study, the role of nurses in recognising and responding to clinical deterioration in postoperative orthopaedic and general surgical patients was explored.

Background

Rapid Response Systems (RRS) are early warning systems with objective activation criteria that result in expert assessment and management of the deteriorating patient at the point of care (Australian Commission on Safety and Quality in Healthcare (ACSQHC) 2008). RRS systems include an ‘afferent arm’ that is focused on early recognition of deterioration and an ‘efferent arm’ that focuses on response by mobilising staff trained in resuscitation and critical care to come to the patient. In Australia, the ACSQHC (2014) recommends the use of a graded RRS system (based on predefined severity criteria) that includes: (i) Medical Emergency Teams (MET) for patients with critical changes in predefined physiological parameters who require urgent (immediate within 3-5 minutes) review and (ii) early clinical review (or pre-MET) for patients with early predefined physiological changes who require timely (within 30 minutes) review before further deterioration occurs.

Recent developments in the recognition of clinical deterioration have aimed at improving the afferent arm of RRS systems by introducing a ‘track and trigger’ approach to patient monitoring (Jones et al. 2012). The ACSQHC (2014) defines track and trigger systems as: “a formal processes that relies on periodic measurement of observations (tracking), with predetermined action when certain thresholds are reached (triggering)” (ACSQHC 2014). The principles of human factors design have been incorporated into the design of these observation charts whereby graphs are used to chart vital signs and thresholds for triggering pre-MET or MET review are colour coded (ACSQHC 2014). The design of these charts is based on the principle that human cognition naturally processes changes in visual patterns more effectively than changes in numerals, thereby decreasing delay in recognition of clinically important

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changes. Christofidis et al. 2013; Chatterjee, Moon, Murphy, Donohue & Endacott 2010; McGain 2008; Jones et al. 2012; McKenna et al. 2013; Ratwani, Trafton, Boehm-Davis 2008). The use of these charts in acute health care is mandated in Australia. (ACSQHC 2014).

Patients undergoing major surgical procedures are at increased risk of acute complications in the immediate postoperative period often resulting in acute deterioration (Goldhill, 2005; Group EC 2015; Gustafsson et al, 2011; Liddle 2012; McNicol et al. 2007; Scott et al, 2015). Haemodynamic instability in the post-anaesthesia care unit (PACU) is one of the main predictors of subsequent deterioration in postoperative patients (Bassi et al. 2004; Goldhill 2005; Kleinert et al. 2010; Liddle 2012; McNicol et al. 2007; Thompson & Magnuson 2012). In older adults undergoing orthopaedic and major general surgery, age and multiple comorbidities also contribute to an increased risk of postoperative complications and clinical deterioration (Chong et al. 2011; Liddle 2012; McNicol et al. 2007; Srilata, Durga & Ramachandran 2014).

Nurses play a vital role in the early detection and management of clinical deterioration because they are the group of professionals with the highest degree of patient contact (Considine & Currey 2015; Considine, Trotter & Currey 2016; Ludikhuize, de Jonge & Goossens 2011). There is some evidence that the outcomes of RRS activation (specifically whether patients are transferred to ICU) is influenced by who activated the call (Lobos, Fernandes, Ramsay & McNally 2014). It is therefore important to understand what factors influence activation of RRS by different members of the team.

A critical aspect of the effectiveness of RRS systems is nurses' decision-making which includes documentation and interpretation of vital signs and clinical data, and escalation of care if indicated (Ludikhuize et al. 2011). Barriers to patient monitoring and documentation remain an issue in acute care settings and it has been reported that many patients have prolonged periods of physiological instability prior to escalation of care (Hogan 2006; McGain et al. 2008; National Patient Safety Agency (NPSA) 2007). Inconsistencies in the frequency at which patients are assessed, misinterpretation of clinical data, and reporting delays have been documented as barriers to timely RRS activation in response to clinical deterioration (Odell et al. 2009). Other reported barriers to early escalation are: heavy workloads, insufficient resources, and poor safety procedures (Subbe & Welch 2013; Thompson 2009).

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74 There are a number of studies exploring why nurses may not escalate care of
75 deteriorating patients appropriately (Bagshaw et al. 2010; Beaumont et al. 2008; Jones et al.
76 2006; Odell et al. 2009; Shearer et al. 2012; Stuart et al. 2011). Shearer et al. (2012) in an
77 Australian study found that clinical staff failed to escalate care for patients that fulfilled RRS
78 criteria although they reported being concerned about their patients' clinical status. In this study,
79 it appeared that ward culture influenced staff reporting behaviours and that the expectation (on
80 the part of the ward-based team) was that escalation to RRS was not necessary for all patients
81 who fulfilled RRS criteria. Thompson et al. (2009) found that nurses identify deteriorating
82 patients correctly but that their communication style, that focused on subjective phenomena
83 rather than objective measures failed to gain medical attention.

84 As the early identification of clinical deterioration is largely based on physiological
85 parameters, many health services have introduced the additional criterion of 'clinician concern'
86 or 'worried staff' as part of the RRS criteria (McNeill & Bryden 2013; Douw et al. 2015). The
87 'clinician concern' criterion allows nurses to activate an emergency response for patient review
88 without waiting for the patient to fulfil vital sign criteria for escalation of care (Cioffi et al.
89 2010). The 'clinician concern' criterion provides a mechanism for escalation of care based on
90 subjective, or qualitative assessment of changes in the patients' status. A number of studies have
91 however found that when the 'clinician concern' criterion was used that there were also objective
92 changes in patients' clinical signs. An Australian study found that about 30% of MET call
93 activations were related to the clinician concern criterion and that on half of these occasions the
94 clinicians' concern was based on changes in objective parameters (Santiano et al. 2009). Douw,
95 Huisman-de Waal, van Zanten, van der Hoeven & Schoonhoven (2016) have developed a
96 scoring system based on a systematic review of events that nurses identified as being of 'clinical
97 concern'. Based on this work they developed the "Dutch Early Nurse Worry Indicator Score",
98 that when used in combination with objective physiological signs had greater predictive accuracy
99 in identifying patients who required higher acuity of care than objective measures alone. In
100 addition, there is clear evidence that providing nurses with a structured approach to clinical
101 assessment, such as use of the primary survey approach facilitates early recognition of clinical
102 deterioration and may improve communication with the multidisciplinary team (Considine &
103 Currey 2015).

A gap in current research exists in relation to understanding nurses' perception of their role in recognition and response to clinical deterioration in the early postoperative period, and what factors are currently barriers to early escalation of care.

Aims

The aim of the study was to explore nurse' role in recognising and responding to deteriorating postoperative patients. The specific research questions were

(1) What were the views of nurses working on two surgical wards about their role in response to clinical deterioration in the first three postoperative days?

(2) What were the nurses' perceptions of the barriers to implementation of early intervention strategies for deteriorating patients in the early postoperative period?

METHODS

Design.

An exploratory descriptive qualitative study design was used. Qualitative description was used as this allowed the researchers to explore nurses' views and perceptions within their current working environment (Schenider & Whitehead, 2016). Study data were collected using focus groups, which will be described in detail later in this paper. The study was approved by the Human Research Ethics Committee at the study site and at Deakin University.

Setting

The study was conducted on a 28-bed general surgical and 24-bed orthopaedic wards at a metropolitan hospital in Australia. The study site had a three level RRS in place at the time of the study; Code Blue (cardiac arrest call), MET call and pre-MET call. Code Blue was defined as an immediate response required for cardiopulmonary arrest. MET Call was defined as critical care within five minutes for deteriorating patient that fulfilled predefined criteria. Pre-MET was defined

as an urgent medical review within 15-30 minutes, for a deteriorating patient that meets predefined criteria.

Sample/Participants

A convenience sample of 14 registered nurses was recruited for the study. The 14 nurses were from four focus groups consisting of two to five nurses who cared for postoperative patients conducted between September 2014 and October 2014. Nine nurses from the orthopaedic ward and five nurses from the general surgical ward participated in the interviews. Nurses interviewed were registered nurses, who were permanent staff members of the wards involved in the study and who held roles that provided direct patient care. Second level nurses (enrolled nurses in Australia), and registered nurses who were not permanently employed on the study wards were excluded because as they were expected to escalate care to the nurse in charge of the shift in the first instance.

Data collection

Study data were collected using brief focus groups (10 to 20 minutes duration) conducted during the team huddles that occurred between change of morning and afternoon shifts. The focus groups were held in the meeting rooms of the respective surgical wards. 'Team Huddles' are brief, team meetings that take place within the practice environment and have been used successfully in a range of healthcare contexts to improve team communication, team work and situational awareness (Hansell & Kirby 2015; Martin & Ciurzynski 2015). The use of team huddles to collect nurses' perspectives was considered appropriate for this study as it enabled the researchers to gain insights from nurses about their practice while they were embedded within their usual clinical context. Consent was obtained from each staff member who participated in the focus groups and participants were asked to provide information regarding their level of clinical experience and their role on the ward just prior to the commencement of the team huddle. For consistency, an interview guide was used to facilitate discussions during the focus groups (Table 1). The interview guide was developed based on the project aims and hospital policies for recognising and responding to clinical deterioration. The researchers trialled the interview guide with ward staff from one of the study wards through a mock focus group. This process was to ensure clarity and understanding of questions and to determine if the interview guide was appropriate to answer the research aims. The focus groups were recorded

and transcribed following each interview. Each interview was given a number code for ease of identifying quotes as well as emerging themes.

Ethical considerations. The study was approved by the Human Research and Ethics Committees at the study site and Deakin University.

Data analysis.

Initially inductive qualitative content and thematic analysis of the interview transcripts was undertaken by two researchers and followed these steps: (1) reading and familiarisation with the data, (2) identification of key themes emerging from the interviews, (3) recording of exemplars in the form of illustrative quotes to provide evidence to support the identified themes (Cleary, Horsfall & Hayter 2014). Once the initial thematic analysis was complete the interview transcripts and identified themes were reviewed and discussed with a third independent researcher until consensus concerning the thematic structure of the data was achieved. The identified themes were then grouped into three major themes and associated sub-themes based on consensus between the three researchers (Braun & Clark 2006). Data saturation was noted when no new information emerged from the transcripts of the focus group huddles (Cleary, Horsfall & Hayter 2014). Quotes from the focus group interviews are de-identified and coded as follows: Participant number, focus group number and clinical area in which the participant worked (orthopaedic or general surgery).

RESULTS

A total of 14 nurses participated in the four focus groups. There were two focus groups conducted in each of the ward areas involved, nine nurses working on the orthopaedic ward and five nurses working on the general surgical ward participated in the focus groups. The majority of participants were female 13, (87%) there were two graduate nurses one from each surgical unit who had six months experience as graduate nurses, the remainder were permanent staff with at least three years of surgical nursing experience (mean 7.4 years, range 2 to 18 years) experience.

There were two major themes that arose from the focus groups: i) “struggling with blood pressure” and ii) “we know our patient is sick”. The subthemes identified within theme one were: “juggling patients fluid balance” and “taking action to prevent hypotension”; the subthemes within theme two were: “clinician concerned criterion is a safety net” and “MET call is our last resort” (Table 2). These themes are described below with supporting quotes from the focus groups conducted on the general surgical and orthopaedic wards.

Theme 1: Struggling with blood pressure.

Hypotension was identified by the focus group participants in both clinical areas as the most common issue in the immediate postoperative period and they anticipated that most patients were at risk of hypotension.

Sub-theme – *Juggling patients’ fluid balance*

The orthopaedic nurses thought that inadequate fluid management pre/intra-operatively, anaesthetic type (spinal/regional/general), and early return of patients to the ward from the post anaesthetic care unit (PACU) all contributed to the high frequency of hypotension. The orthopaedic nurses commented that the problem started with the prolonged periods of time that some patients were required to fast preoperatively. “Yes, [the patient] is fasting the whole day, and they become tachy[cardic]” (P1, FG2, Ortho). One participant thought that the patients should be assessed more systematically on admission so that there was an objective record of their hydration status prior to their surgery.

On admission I think they [the medical team] should do blood tests really religiously and try to assess their hydration [status] prior to theatre. (P3, FG2, Ortho)

Other factors contributing to postoperative hypotension in orthopaedic patients identified by the orthopaedic nurses was the medical staff preference to keep intravenous fluid to a minimum peri-operatively to prevent fluid overload.

The patients always do [drop their blood pressure] because they don’t give them enough fluids intra-op [intraoperatively]. (P1, FG1, Ortho)

Blood loss, ... not enough fluids post-surgery, fasting for a long time []re-operatively.((P2, FG1, Ortho)

The intraoperative use of sympathomimetic agents such as metaraminol to maintain systolic blood-pressure at acceptable levels was thought to be common and also contributed to the frequency of hypotension in the early postoperative phase. Nurses reported that once the short-acting sympathomimetic medication (metaraminol) wore off upon their return to ward, along with additional factors such as the need for post-operative analgesia, the patients were highly likely to become hypotensive.

They also give aramine [metaraminol] in recovery too, to bring the blood pressure up. They just do a big general signature; you try to work out how much fluids they have had (it is often unclear how much how much fluid was given in theatre).
(P5, FG1, Ortho)

Other factors identified by the orthopaedic nurses that contributed to postoperative hypotension included the side-effects of analgesia, anaemia as a result of intraoperative blood loss and patients experiencing a vasovagal when they were first stood out of bed and mobilised.

If the patient is in pain they give them lots of pain relief because we are not taking the patient back [to the surgical ward] if they are still in pain...Then they stuff the patient with lots of pain relief and call us back [when their pain is controlled] but [the analgesics used] drop their blood pressure.
(P3, F1, Ortho)

When they mobilise with physio for the first time post operatively they drop their blood-pressure... (P3, FG2, Ortho)

In contrast, the general surgical nurses thought that hypotension in their cohort of patients was caused by multiple mechanisms (hypovolaemia, arrhythmia, bleeding, fluid and electrolyte

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shifts following major abdominal surgery). They also reported that although some patients did have persistently low blood pressure for a long period postoperatively, and in some cases the patients' haemodynamic status would recover without further intervention.

We do get post-op hypotension, but other times they go into APO [acute pulmonary oedema], because we overload them. (P2, FG4 GenSurg)

Sub-theme -Taking action to prevent hypotension

When asked about examples of clinical deterioration and how they managed them, the orthopaedic nurses identified that the most common cause of deterioration that fulfilled RRS criteria was hypotension. This was usually managed by encouraging patients to increase their oral intake because they believed that most common cause of hypotension was dehydration. If increased oral fluid intake was deemed insufficient to maintain their blood pressure, they would request medical review and patients were often also treated with increased intravenous fluids.

You give them [the doctors] a few hints, we have tilted the bed, given them as much as possible to drink, or they are too drowsy and unable to drink and we have given them a full 100ml flush bag after the [intravenous] Panadol. What else can we do? (P4, FG1, Ortho)

The orthopaedic nurses felt that they usually recognised early signs of deterioration and that they managed these events proactively.

"We generally give them [the junior medical staff] the heads up, for example: if their observations [vital signs/ blood -pressure] are trending down. Then they increase their fluids or write up another bag [of intravenous fluid]." (P2, FG1, Ortho)

There were contrasting views between the orthopaedic and general surgical nurses about whether the fluid management protocol which would allow nurses to respond proactively if they

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assessed their patients as dehydrated would be appropriate. Some nurses working on the orthopaedic ward stated the need for a protocol that allowed them to initiate intravenous fluid bolus while calling a pre-MET for hypotension, as this would be beneficial for orthopaedic patients. They further stated that a nurse initiated fluid bolus should only be authorised by senior nurses who was permanent on the orthopaedic ward, because they felt inexperienced or casual staff who were unfamiliar with the patient population might not use such a protocol appropriately.

In contrast to the suggestions made by the orthopaedic nurses, the general surgical nurses were not confident about the concept of having a nurse initiated intravenous fluid protocol. They believed that hypotension (in general surgical patients) was not always caused by hypovolaemia, and that it was too hard to balance between over hydrating and re-hydrating patients. They thought that there were too many factors complicating clinical decision making for nurses to initiate management of these episodes. The nurses on the general surgical ward did not believe that postoperative hypotension should be managed just by giving additional fluids without additional expert assessment to identify the underlying cause.

..with the type of patients on the ward, hypotension is usually not straight forward because there are many contributing factors, hypotension is not always low volume, it could be bleeding, likewise tachycardia. A nurse initiated fluid bolus is not appropriate.

(P3, FG3, GenSurg)

The general surgical nurses were also not prepared to take on that extra responsibility of managing hypotension independently with a nurse-led protocol as they believed it was safer to obtain a medical review from a senior staff member.

No, we would not want a ward nurse initiated protocol for fluids... because they are post op patients it is too hard to balance between over hydration and under hydration of the patient..... Also, when our patients are unwell, we almost always want to go above the intern for a patient review.

(P1, FG3, GenSurg)

Theme 2: We know our patients are sick.

293 The second major theme that emerged from the focus group interviews was “we know
294 our patients are sick”; nurses working on both clinical areas demonstrated a high level of
295 awareness of the likelihood of clinical deterioration occurring in the early postoperative period
296 and their role in escalating care. The nurses from both wards reported a clear awareness of their
297 responsibilities in the care of postoperative patients such as measuring, interpreting and
298 monitoring the trends of vital signs, and reporting to medical officers if there were any concerns.
299 They reported that they were confident about which clinical signs to look out for, and the
300 appropriate channels to use to escalate care. On both wards, nurses reported that the track and
301 trigger observation chart was very helpful and enabled them to identify deteriorating patient prior
302 to patient meeting escalation criteria. “The track and trigger charts normally alerts us when they
303 are deteriorating” (P2, FG3, GenSurg).

304 Despite expressing their confidence in identifying patients who were likely to deteriorate
305 the orthopaedic nurses reported that some episodes of deterioration could occur spontaneously or
306 suddenly, such as vasovagal episodes in which patients suddenly dropped their blood pressure
307 and in this context the colour coded observation charts were not that useful for providing pre-
308 warning of deterioration. They reported that when some patients are stood up out of bed for the
309 first time by the physiotherapy team and they experience a “a vasovagal and there is vomiting
310 everywhere, we didn’t see it coming”. (P4, FG2, Ortho)

311 “The blood pressure might be fine, but their Hb [haemoglobin] will be low, then
312 physio get them up, and then ...bang down goes their blood pressure.”
313 (P2, FG2, Ortho)

314
315 Some of the barriers to early management of identified by the orthopaedic nurses
316 included early return of patients from PACU. Orthopaedic nurses reported that the PACU nurses’
317 definition of “stable” was based on a checklist criteria and is “in the moment” rather than
318 whether the patient showed trends for haemodynamic instability. Specifically, it was felt that the
319 PACU staff accepted a patient as stable even if they had required repeated doses of metaraminol
320 to maintain an acceptable mean blood-pressure. This approach was inconsistent with the ward
321 criterion for acceptable blood pressure that was based upon systolic blood pressures that were
322 stable without the need for additional inotropic support.

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They use different things to us, they use the MAPS [mean arterial pressure], we don't have that on the ward. [Different protocols for management of vital signs in recovery, no RRS criteria]. (P2, FG1, Ortho)

..... because the recovery staff can try and send patient back with a systolic blood pressure sitting right on 90 [mmHg], so we have to refuse them because them, because it goes below that you have to MET call them. (P1, FG2, Ortho)

Sub-theme: '*Clinician concerned criterion*' is a safety-net

The orthopaedic nurses stated that they normally monitored their patients and notify the treating medical officer via the paging system rather than escalating directly to a MET call if they felt that their patient was unwell but their observations did not fulfil escalation criteria. They did however acknowledge that at times they needed to escalate to a MET call if no response was obtained from the paging system, for example one nurse commented that "Some of them [doctors] just ignore that stuff till you end up calling a MET" (P3, FG2, Ortho).

In contrast, the nurses working on the general surgery ward had a different perception of their role in postoperative care and different point of view about recognising clinical instability. When asked how they managed early signs of deterioration, the general surgical nurses responded that they actively monitored patients and would escalate care if the patient was symptomatic or they were concerned even if the reading did not meet escalation criteria. They felt that the "clinician concern" criterion for MET call was very useful and if they were concerned that they could always use this criterion for urgent medical review. On the general surgical ward, the nurses reported using the "clinician concerned" criterion 5% to 20%, of the time if their observations looked fine but they were concerned. Staff confidence in activating the MET calls from their own clinical judgment and instinct was high. A staff member cited an example of a MET call being activated using the "clinician concerned" criterion, because a patient was in extreme pain. Following investigations, it was found that the patient had a perforated bowel.

We are also not shy of activating a MET call using ‘nurse worried criteria’, if we are concerned. (P1, FG3, GenSurg)

The general surgical nurses expressed a preference for escalation using the rapid response team (MET and pre-MET) over paging their surgical unit’s junior medical staff to review a patient. They felt that their patients’ issues (related to haemodynamic and fluid management and/ pain management) were complex, which was why they preferred expert senior staff review over junior medical staff review.

We are also told to go for the highest one, if we find they are in the pre-MET phase, and we are still worried we go to the MET call [nurse worried criteria]. (P1, FG4, GenSurg)

Sub-theme 3: MET call is our last resort.

Participants reported that the response to MET calls was prompt and positive most of the time. However, participants from one group reported that the hospital communication systems was at times a barrier to obtaining a prompt response, giving an example where the hospital switchboard did not use the right pager which delayed the response time. Staff also reported that there were delays in the review of the patients with altered MET call criteria and that at times the response to pre-MET calls was not timely and they needed to escalate to a MET call to get a their patient’s status reviewed.

“One problematic thing, I find, is that when patients’ urine output is consistently at the 30mls/hour mark and you call a pre-Met and no one alters the pre-MET call criteria. And the next hour there is no improvement, so then you have to keep pushing.... Or pre-MET and MET call until someone alters the [escalation] criteria.” (P3, FG2, Ortho)

“Another problem is for instance the patient has tachycardia, you pre-MET or MET call, they [medical staff] come around and order bloods... Great! ... Then within the

next hour, the patient is still tachycardic and you have to activate a MET call again.
.... So when do they feel the need to do something?”. (P4, FG2, Ortho)

DISCUSSION

This study had two major findings. First, the study data suggests that nurses believe that haemodynamic instability is a common reason for RRS activation. During the immediate postoperative period, hypotension was the most common reason for clinical escalation as reported by nurses on both wards. This finding was reassuring as haemodynamic instability (along with abnormal respiratory rates and hypoxaemia) has been documented previously as a common prequel to the subsequent occurrence of in-hospital cardiac arrest, unplanned ICU admission and other serious adverse events (Bellomo et al. 2003, Buist et al. 2004; Chen et al. 2009; Considine et al. 2016; Douw et al. 2016; Kyriacos et al. 2011; Jones et al. 2006b; Liddle 2012). In the focus groups, nurses dwelt on the management of postoperative hypotension as they perceived hypotension to be the most common and pressing problem in postoperative care, and they discussed the identification and management of this complication in detail. Chen and colleagues have shown that the most common indication for RRS activation was hypotension and/ decreased Glasgow Coma Score (GCS) (Chen et al. 2009), and that a delay of more than 15 minutes in RRS activation was associated with ICU admission or death (Chen et al. 2015).

Although the surgical nurses interviewed in our study were able to identify hypotension as a common trigger for the activation of RRS, there was little said about the early recognition of other complications. Interestingly, the participants did not raise respiratory distress or cognitive deterioration as important causes of clinical deterioration in the postoperative patients on their wards. That may reflect the nurses' perception that causes of deterioration other than hypotension are more insidious in onset and appear less likely to result in a critical event. This finding is concerning as current evidence suggests that the presence of an abnormal respiratory rate, specifically tachypnoea, and changes in mental state are the least consistently documented vital signs however, they are the most predictive of subsequent episodes of clinical deterioration and serious illness in hospital (Considine et al. 2016; Cretikos et al. 2008; Downey et al. 2008; Harrison et al. 2006; Quach et al. 2008)

Secondly, nurses were confident to activate MET calls. This is consistent with one previous study which showed that more than 97% of nurses agreed that MET activation gave them the opportunity to seek assistance, and 81% disagreed with being reluctant to activate MET calls for fear of criticism (Jones et al. 2006a). In contrast to previous studies that reported nurses were reluctant to escalate MET calls for fear of criticism and that this was a significant barrier to implementation of early interventions (Odell et al. 2009; Thompson et al. 2009; Stuart et al. 2011), we found that the nurses interviewed were confident to activate RRS and that this was an expected part of the ward culture. This was a positive finding demonstrating that nurses had increased awareness of the importance of timely escalation of care and proactive management of deteriorating patients. The finding also highlights that there have been improvements in nurses' clinical practice in providing a timely response to clinical deterioration over the past decade (Ludikhuize et al. 2011).

In contrast, to previous studies that found that nurses activated rapid response systems based on clinical judgement and intuition rather than pre-defined MET call criteria (Bagshaw et al. 2010; Beaumont et al. 2008; Jones et al. 2006a; Odell et al. 2009), the nurses working on the postoperative surgical wards reported that most pre-MET or MET calls were based on abnormal vital signs with occasional activation using the "clinician concern" criterion (Considine et al. 2016; Elliot et al. 2016). This demonstrates that the surgical nurses were basing their identification of clinical deterioration on objective criteria rather than subjective intuition alone (Douw et al. 2016; Santiano et al. 2009). This is a positive finding demonstrating improvements in nurses' assessment skills and clinical decision making when managing a deteriorating patient (Thompson et al. 2009). The use of objective criteria also aids in early recognition of clinical deterioration and improves communication with the treating medical team, which may in turn result in better patient outcomes (Considine & Currey 2015; De Vita et al, 2010; Elliott et al. 2016; Thompson et al. 2009).

Delayed responses by medical staff to attend to patients during the pre-MET phase resulted in a need to activate the MET team. Staff expressed the positive impact of the pre-MET system, however they felt that the response was sometimes delayed which made their work harder. The findings from our study was consistent with previous research suggesting that delay

in obtaining medical review contributed to further delays in the management of patient deterioration post-operatively (De Vita et al. 2010; Subbe & Welch 2013).

The nurses working on the orthopaedic and general ward had mixed opinions about the most appropriate postoperative management of patients. The nurses on the general surgical ward reported expecting their patients to be unstable postoperatively following major abdominal surgery. In line with previous research, the general surgical nurses also expected that their patients would frequently fall within the MET call criteria in the immediate postoperative period. (Group EC 2015; Gustafsson et al, 2011; Scott et al, 2015). In contrast, the nurses from the orthopaedic ward believed that if patients were managed adequately pre and intraoperatively that their patients would be haemodynamically stable postoperatively. In contrast, nurses on the orthopaedic ward felt that patients were frequently transferred to the ward from the post-anaesthetic care unit too rapidly without any proactive management plan for hemodynamic instability. The orthopaedic nurses also reported that there was limited/inaccurate documentation around intraoperative blood-loss and that this made an accurate assessment of patients' true hydration status more difficult.

Limitations

This was a single site study therefore the results may not be applicable to other centres, due to differences in patient and staff characteristics and the models of care delivery used. The sample was self-selecting so there may be issues with sampling bias, however, nurses were recruited from two wards and were of varying levels of clinical experience. The participants in this study were all registered nurses therefore the perspectives of enrolled nurses and non-permanent nurses working surgical settings is unknown. Finally, the study was based on self-reported practice that may or may not reflect actual clinical practice.

Conclusion

These findings suggest that educational initiatives and organisational systems to improve recognition and response to clinical deterioration are influencing clinical practice however further research on a broader scale is warranted to understand the magnitude of translation and identify implementation gaps. The results of this study highlight the importance of a collective team approach to preventing, recognising and responding to clinical deterioration across the

whole patient journey. Initiatives to ensure accurate written and verbal communication between medical and nursing staff across both PACU and the wards warrant further assessment.

Relevance to clinical practice.

Nurses on the orthopaedic surgery ward identified that there was scope to decrease the number of RRS calls activated in the first 24 hours postoperatively if orthopaedic patients hydration status was managed more proactively and there was some scope for nurses on the ward to initiate increased intravenous fluid intake prior to activating an RRS call. In contrast the nurses managing complex general surgical patients expressed a preference for the current process for managing patient deterioration as this gave the ward staff rapid access to clinical experts. These differences in perspective between the two clinical areas, highlight the need for localised tailored solutions to manage the specific clinical issues that occur in different patient cohorts. Any interventions developed to improve the management of clinical deterioration in postoperative patients also needs to be appropriate to the skill mix of staff and care processes in specific health care services. There is a need for further evaluation to explore whether protocols can be introduced that will assist nurses in preventing acute episodes of haemodynamic instability in the early postoperative period without increasing the incidence of other complications such as fluid overload and acute pulmonary oedema.

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Table 1: Focus Group Interview Guide

Interview Guide		
➤	Have any of the patients you cared for deteriorated?	
➤	How did you know they were deteriorating?	
➤	How do you (as a surgical nurse) contribute towards the response for patients identified as deteriorating?	
➤	In your opinion, what are the positive and negative issues related to recognition of clinical deterioration in your clinical area?	
➤	When you have a patient who you think is deteriorating but does not fulfill or RRS criteria, how do you manage the situation?	
➤	Apart from the pre-MET/ MET call criteria, what do you observe (or see) as other important indicators of clinical deterioration among your patients.	
➤	Do you feel that the pre-MET/ MET call criteria “Nurse Worry/ Clinical concern” enables you to ask for a patient review even when there are no obvious objective signs of deterioration?	
➤	Do you think that the RRS call system enables you to receive a rapid response for early deterioration?	

Table 2 Themes and Sub-themes

Theme	Sub-themes	
1. Struggling with blood pressure	<i>Juggling patients’ fluid balance</i>	Taking action to prevent hypotension
2. We know our patients are sick	<i>‘Clinician Concerned’</i> criteria is a safety net	MET call is our last resort

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