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Title

Identifying barriers and facilitators to recognition and response to patient clinical deterioration by clinicians using a behaviour change approach: A qualitative study

Running Title

Determinants of response to clinical deterioration

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We wish to confirm that there are no known conflicts of interest associated with this publication and nor significant financial support for this work that could have influenced its outcome.

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Author contributions

Authors RMW, APM, LMA, AV, MC conceptualised the idea and designed the study. RMW was responsible for data acquisition. Authors RMW, RB analysed the data. All authors participated in interpretation of the data, preparation of the manuscript, and review of the final manuscript.

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Abstract

Background

Failure of clinicians to recognise and respond to patient clinical deterioration is associated with increased hospital mortality. Emergency response teams are implemented throughout hospitals to support direct-care clinicians in managing patient deterioration, but patient clinical deterioration is often not identified or acted upon by clinicians in ward settings. To date no studies have used an integrative theoretical framework in multiple sites to examine why clinicians' delay identification and action on patients' clinical deterioration.

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Aim

To identify barriers and facilitators that influence clinicians' absent or delayed response to patient clinical deterioration using the Theoretical Domains Framework.

Methods

The Theoretical Domains Framework guided: 1) semi-structured interviews with clinicians, health consumers, and family members undertaken at two sites; 2) deductive analyses of inductive themes to identify barriers and facilitators to optimal care. This study complied with the COREQ research guidelines.

Findings

Seven themes identified: 1) information transfer; 2) ownership of patient care; 3) confidence to respond; 4) knowledge and skills; 5) culture; 6) emotion; and 7) environmental context and resources.

Discussion

The Theoretical Domains Framework identified traditional social and professional hierarchies and limitations due to environmental contexts and resources as contributors to diminished interprofessional recognition and impediments to the development of effective relationships between professional groups. Communication processes were impacted by these restraints and further confounded by inadequate policy development and limited access to regular effective team-based training. As a result, patient safety was compromised, and clinicians frustrated.

Conclusions

These results inform the development, implementation and evaluation of a behaviour change intervention and increase knowledge about barriers and facilitators to timely response to patient clinical deterioration.

Relevance to clinical practice

Results contribute to understanding of why clinicians delay responding to patient clinical deterioration and suggest key recommendations to identify and challenge traditional hierarchies and practices that prevent interdisciplinary collaboration and decision-making.

Keywords

patient safety, policy, clinical decision-making, organisational behaviour, qualitative study

Impact statement

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

- Early detection of patient clinical deterioration and emergency team activation by clinicians on general wards is infrequent and contributes to adverse events. While emergency response teams have been established and implemented throughout hospitals to support direct-care clinicians to manage patient deterioration, preventable adverse events still occur due to absent or delayed response to patient deterioration.

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- This study offers an understanding of potential barriers and facilitators to clinicians' early identification and action on patients' clinical deterioration from a behavioural perspective using the Theoretical Domain Framework.
- Results from this study inform nursing practice and future research as they contribute to evidence informing behavioural change interventions directed at improving management of patient clinical deterioration. They also have wider implications for the way health clinicians are educated and trained to promote optimal patient care and support for each other.

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Background

Adverse events are defined as often preventable, life threatening occurrences for patients that can result in prolonged hospitalisation, in-hospital cardiac arrest, admission to intensive care, and/or death (Rafter et al., 2015). Failure to quickly recognise and respond to clinical deterioration (within 15 minutes) is associated with increased hospital mortality (Chen et al., 2015). Delays therefore contribute to adverse events for patients (Chen et al., 2009; DeVita et al., 2006) at significant cost to them, the health service and wider community (Ehsani et al., 2006). Adverse events are potentially preventable as they are frequently preceded by changes in vital signs (Trinkle & Flabouris, 2011). Emergency response teams (also referred to as medical emergency or rapid response teams) led by nurses and/or medical officers have been established and implemented to support direct-care clinicians in responding to patient deterioration (DeVita et al., 2006; Massey et al., 2014). Despite the effectiveness of emergency response teams (Hillman et al., 2014), preventable adverse events still occur.

Evidence suggests the early signs of patient clinical deterioration are often not identified or acted upon in a timely manner by nurses and medical officers in general medical-surgical wards (Liaw et al., 2015; Petersen et al., 2017), thereby reducing the effectiveness of emergency response teams (Chen et al., 2009). Absent or delayed detection by clinicians may result from fear of reprimand, lack of knowledge about the role of emergency response teams, inadequate monitoring and observation, heavy workloads, and limited access to supportive and knowledgeable leaders (Allen, 2020; Olsen et al., 2019).

While exploring the determinants of timely recognition and initiation of life-saving interventions has attracted extensive research interest (Treacy & Stayt, 2019), a recent review (Al-Moteri et al., 2019) found that interventions involving targeted education were often ad hoc and inductive rather than informed by a theoretical framework. Thus, interventions effected little overall improvement in clinicians' timely response to patient deterioration. As explanation, the authors proposed that human behaviour, local ward environmental and cultural factors were equally influential in determining response to patient deterioration as factors of knowledge and protocols. Education is an important pre-requisite for behaviour change, but is rarely sufficient as a single strategy to achieve change (Atkins et al., 2017). The use of a theoretical framework to explore the influences of behaviour in the context in which they occur offers the potential benefit of identifying the causal mechanisms of failures in the system and discover the principles behind barriers and facilitators (Cane et al., 2012; Michie et al., 2011). The Theoretical Domain Framework (TDF) (Cane et al., 2012; Michie et al., 2011) provides a theory-based approach to make a behavioural diagnosis appropriate to inform intervention functions and specific behaviour change techniques. To date no studies have used an integrative theoretical framework in multiple sites consecutively to examine why clinicians delay identification and action on patients' clinical deterioration.

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Objective

The purpose of this study was to build on existing knowledge of potential barriers and facilitators to clinicians' early identification and action on patients' clinical deterioration in order to: 1) further understand clinicians' behaviour in their local context using the TDF (Cane et al., 2012; Michie et al., 2011) and 2) inform intervention development based on these understandings. This paper presents the first part of a two-phase study.

Methods

Study design

This study is grounded within a framework of psychological theories and constructs related to behaviour change (Cane et al., 2012; Michie et al., 2005). The TDF provided a theoretical lens through which to view the influences on clinician behaviour that impacted on recognition and response to patient clinical deterioration (Atkins et al., 2017). This qualitative approach involved semi-structured individual and focus groups interviews with clinicians, health consumers, and family members to capture the full range of nuanced and contextual complexities associated with health care provision. The TDF guided interview questions and data analyses, thereby limiting investigator bias by systematically examining the cognitive, affective, social and environmental factors that influence behaviour.

Interviews and focus group interviews were conducted by RMW at site A and by registered nurses with master's degrees in nursing under the oversight of APM at site B. All researchers involved in the study were female registered nurses with either doctorate or master's level research qualifications. This study complied with the COnsolidated criteria for REporting Qualitative research guidelines (Tong et al., 2007) (see Supplementary File 1).

Setting

Clinicians from specialist in-patient units of two tertiary hospitals in Australia participated in the study. The rationale for conducting the study in two sites with localised social and cultural characteristics was to use a larger sample size and generate broader information across dissimilar contexts. Ward A was a 28-bed surgical ward that specialised in care of two groups of patients including those with diseases of the liver, pancreas and biliary tract (involving elective surgery) and acute surgical admissions (involving emergency surgery) both with their own teams of medical staff. During the day shift there were two nurse leaders on the ward: the 'in-charge' who coordinated the shift and provided support for staff, and the 'discharge case-manager' whose role was to ensure a supported transition of patients back into the community. Ward A had recently moved from paper-based to integrated electronic health records.

Ward B was a 28-bed mixed medical-surgical inpatient unit that had recently been established following a move to a newly constructed hospital. It specialised in care of patients with

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gastrointestinal conditions, with six teams of medical-staff and one nurse team-leader to coordinate the shift. Ward B used paper-based health records that were retrospectively scanned and stored in an electronic database.

Clinicians in both participating wards had access to two-tier response systems (nurse and medical-led emergency response teams) to assist clinicians to stabilise and manage deteriorating patients. Decisions on accessing these teams were dependent upon individual clinicians recognising and responding to patients' deterioration using clinical assessment tools developed in accordance with the relevant national standards (Australian Commission on Safety and Quality in Health Care, 2015) and respective hospital policy.

Participants and recruitment

A convenience sample of clinicians (including registered nurses, physicians, allied health such as physiotherapists and members of the nursing-led emergency response teams) who were directly or indirectly responsible for patient care in the participating wards at each hospital were invited to participate in the study via email and face-to-face approaches. Health consumer and family member involvement in the project was identified as important (Consumers Health Forum of Australia, 2018) as they increasingly play a greater role in decision-making within contemporary healthcare systems (Longtin et al., 2010). However, it is often difficult and may be inappropriate to recruit health consumers and family members for often lengthy interviews during their hospital admission. Attempts were made to recruit individuals who had previously received treatment in the participating wards, although this was unsuccessful. As such health consumers and family member representatives were invited to participate via a letter of invitation from a state-wide department of consumer and community engagement. While not having had direct experience at either site, they provided feedback about their general experience of being a patient or family member in hospital. Funds were allocated to remunerate health consumers and family member representatives for their participation, to cover travel costs and parking for each meeting. Study participants were not known to the researchers prior to the study and provided consent to being interviewed following an informed consent process.

Funding and ethical considerations

This study received competitive funding from the Queensland Government and Griffith University. Ethics and governance approvals were granted by the participating hospitals and university (HREC/14/QPAH/565, NRS/48/14/HREC, SSA/14/QPAH/566, SSA/15/QGC/276). The study was conducted in accordance with the Helsinki declaration, National Health and Medical Research Council's National Statement on Ethical Conduct in Human Research.

Materials

The 14 domains outlined in the validated TDF informed the development of the interview guide for the semi-structured individual and focus groups interviews (Cane et al., 2012; Michie et al., 2011).

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The guide was drafted by the lead researchers and refined via discussion with the research team. **Table 1** provides an overview of the interview guide topics categorised to TDF domains.

Data collection and management

Individual and focus group interviews of clinicians were conducted by research staff who were guided in interview techniques to minimise bias. Health consumers and family members contacted the researchers independently to arrange an interview at the participating hospital at their convenience. All interview and focus group data were digitally recorded, professionally transcribed and de-identified prior to analysis. Demographic data were entered manually into a password-protected, electronic database (Microsoft Excel). Field notes were made during interviews and throughout the study to account for contextual issues. All data were securely stored in accordance with health service and university guidelines.

Data analysis

Following an initial review of interview transcripts to ensure accuracy and completeness, researchers from each site (two from site A and three from site B) had a series of meetings to familiarise themselves with the data and identify contextual issues that influenced behaviour around patient clinical deterioration in each ward. Researchers then undertook a moderation process where they coded the transcripts inductively to ensure consistency of understanding and identify themes, then plotted themes to the TDF via a deductive process. This moderation process continued until data saturation had been achieved.

Rigour

The trustworthiness and rigour of this qualitative study were achieved by ensuring dependability, confirmability, credibility, and transferability of data, as outlined by Lincoln & Guba (1985). Credibility was enhanced by using a semi-structured interview guide based on the TDF to ensure a consistent approach to interviewing. While accuracy and authentication of data was achieved through peer debriefing, recording, and professional transcription of interviews, dependability and confirmability were achieved through provision of an audit trail, namely the maintenance of reflexive field notes. Transferability was assured by presenting adequate raw data in the form of direct quotes and a detailed description of the research process to enable readers to evaluate the results and assess transferability to other settings and populations.

Results

Phase 1 - Interviews and focus groups

Fourteen clinicians from ward A and 18 clinicians from ward B participated in individual or focus group interviews. Duration of individual interviews ranged from 21 to 72 minutes (M = 47.8

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mins) and 42 to 63 minutes (M = 51.5 mins) for focus groups. Most participating clinicians were female nurses 25 - 30 years of age with a Bachelor of Nursing degree, as outlined in **Table 2**. Two health consumers and one family member were also interviewed about their overall experience.

Seven themes identifying barriers and facilitators consistent with the TDF are described below, drawing on data from both clinical sites in the form of participant quotations.

1. Information transfer

Information transfer referred to clinicians' communication and information-sharing about patient clinical deterioration. Reported barriers to effective information transfer (linked to TDF domains) include hierarchical communication resulting from professional identities and boundaries, assumption of knowledge about patients' condition and actions to manage clinical deterioration, cognitive overload and time constraints due the fast-paced nature of acute clinical environments.

Nurses followed traditional hierarchies based on professional roles to seek advice or share information when reporting patient clinical deterioration.

> *"A junior nurse always goes to a senior nurse; a senior nurse will always ring someone more senior which in this case is [the Nurse-led Emergency Response Team] or a [senior]MO [medical officer],,…and [if] I'm still not happy with my answer, then I'll still go and ring somebody else."* (Ward A, Nurse 1)

They also expressed frustration when communication was not offered or reciprocated.

> *"…doctors only communicate to team leader then rarely communicate to the team of the patient…it would be nice to see them kind of communicate more to nurses which are allocated for patients instead of just communicating to team leader."* (Ward B, Nurse 10)

Monopolisation of information contributed to unnecessary delays to documentation.

> *"…a doctor will take the charts…and carry them around for half an hour so you can't get to the chart …"* (Ward A, Allied Health 1)

While convenient access to information improved in ward A following the implementation of an integrated electronic health record whereby *"….twenty people can be looking at it at once…"* (Ward A, Nurse 8), our analysis found there was no improvement in communication about patient deterioration between professional groups.

Assumptions about who knew what about the patient and who was accountable for their care,

> *"….I had assumed that the registrar knew the patient, and knew what was going on with the patient…"* (Ward A, Nurse-led Emergency Response Team member)
>
> *"…nobody can be held accountable because nobody knows who is accountable."* (Ward B, Nurse-led Emergency Response Team member)

also hampered information transfer and delayed timely responses to patient clinical deterioration.

Assumed knowledge also occurred during handover between nurses at shift change-over. If the nurse receiving the handover at the start of the shift had cared for the patient previously, it was

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presumed they understood the patient's condition. In many instances handover was rushed and incomplete with a reliance on the handover sheet (a summary of patients on the ward) which resulted in nurses commencing their shifts without fundamental knowledge about their patient's condition. As a result, nurses would be informed by:

> *"…their handover sheet rather than going the problem…that to me is a big part of where the escalation is failing*" (Ward B, Nurse-led Emergency Response Team member 1).

When concerned about their patient's condition, both nurses and medical officers tended to *verbally* notify and discuss issues related to clinical deterioration rather than read documented sources of patient information, as this was more expedient (memory, attention and decisional processes). This practice of verbal orders *"….[that] never actually gets written down."* (Ward A, Nurse-led Emergency Response Team member) placed clinicians at significant legal risk, and increased patients' clinical risk. In addition, given their clinical responsibilities, nurses tended to document the progress of their allocated patients at the end of their shift, increasing the possibility of omission of important information. As described by a nurse participant:

> *"…sometimes I feel like you're so frazzled after a shift that you're just like, I have no idea. I've done a million things for this patient, but I don't know where to start and I don't know what to write."* (Ward A, Nurses 2-3).

The fragmented nature of information transfer between clinicians was noted by a family member participant who had cared for a loved one in hospital. While this experience was unrelated to the study sites, it demonstrated the complexity of information transfers and the potential for incomplete or misinformation within busy clinical settings.

> *"It wasn't clear to me at first, and probably for a fair while, who I should communicate with….who the important people were on the ward…it did take me a quite a while, probably a number of weeks to get to know who I should be communicating with so that information would be passed along to different people."* (Hospital A, Family Member 1.)

2. Ownership of patient care

While aligned to information transfer, this theme was characterised by a social tension between nursing staff and junior medical officers (also known as residents or interns) who made decisions about patient care. Given their professional role, senior medical officers (referred to as registrars and consultants) were ultimately responsible for patient management and decision-making. As such they essentially 'owned the care of the patient', so that only they had the authority, for example, to alter vital signs assessment criteria (such as blood pressure, heart rate) where they judged them to be appropriate for the patient. However, senior medical staff were often unavailable for long periods of time (due to surgery, for example), adding to delays in reviewing deteriorating patients, altering assessment criteria and/or in checking modified assessment criteria within 24-hour timeframe, as mandated by hospital policy.

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"….criteria can only be changed by a registrar or a consultant…to be reviewed every 24 hours…..when you're concerned about a patient, that review of a patient doesn't get done…eight times out of ten I would say." (Ward A, Nurse Educator 1)

The absence of senior medical officers to make decisions also reduced the capability of junior medical officers to act.

"It's a top-down thing for them sometimes [junior doctors] as well. They can experience bullying themselves….they might not be as confident in their clinical decision making. They need to report them to the registrar." (Ward A, Nurse 1)

However, this hesitancy led to frustration and regret for nurses as they were professionally mandated by organisational policy to respond to clinical deterioration by seeking a medical review.

"policy tells you…you have to get that medical review and then you act accordingly to what's been told, and then obviously if he continues into an orange [a colour-coded early warning alert identifying patient deterioration requiring escalation] then that's when you call the code…. It's very frustrating when you are looking at your patient and you can see that they haven't improved and that they're still working quite hard, but then you've got the [junior] medical officer standing next to you going no, it's okay don't worry about it." (Ward A, Nurses 5-6)

The potential for delays was further increased after-hours when reduced staffing of senior medical officers resulted in anxiety about accessing support to manage deteriorating patients.

"After hours, there aren't as many people around…they're not as senior from the nursing point of view. Our [ward] nurse manager's not here, the clinical facilitator is not here…So less…senior staff and then I guess the fact that the medical team, there's one [junior surgical call] doctor for the surgical patients, so difficult to access them sometimes." (Ward A, Nurse 4)

This may explain why nurses preferred contacting the nurse-led emergency response team for assistance rather than the one junior medical officer responsible for the entire division.

"After hours we ring the [nurse led emergency response team]…who…actually come." (Ward B, Nurses 11-12)

Ownership of the care of 'outlier' patients was also identified as a source of frustration for nurses and junior doctors. 'Outlier' patients are relocated to alternative clinical areas when their admitting team's ward is unable to physically accommodate them, as occurs during peak bed shortages. Nurse participants expressed concerns about the vulnerability of 'outlier' patients due to their physical separation from their treating team.

"Outliers are hard for us, because on the weekends…we'll get these random patients. There are patients that are waiting for days and days for no reason, just to see the doctor…then when they deteriorate, that's when it's really hard…." (Ward A Nurses 2-3)

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From the perspective of a junior medical officer caring for an 'outlier', the professional demarcation was clear.

> *"…it's just that I don't know the patient and so - I guess in a way, it's something that the treating team should look at because it is their patient, but I would be reluctant to initiate any treatment because they're not my patient and I don't know them very well."* (Ward A, Junior Medical Officer 1)

Ownership of patient care represented a significant barrier for junior nurses and medical officers who feared criticism from senior clinicians. Junior clinicians often lacked the self-confidence to initiate an emergency response, even though policy at both sites clearly indicated an escalation when there were acute and threatening changes to a patient's vital signs.

> *"I think that, ultimately, the consultant who's responsible for that patient….should know that there's modifications in place, and it should be run past him because they might not agree with that decision."* (Ward B, Junior Medical Officer 2)

Some nurse participants reported overcoming this by making extreme demands of junior doctors, or by citing policy to pressure doctors to assess their patients.

> *"…you need to look at this patient now or we're calling a code."* (Ward B, Nurse 1)
>
> *"..we can just play dumb sometimes and palm it off and say, well, policy states that I have to tell you…I guess it has our back in a sense, because you can take that pressure off…I usually say…I'm a new grad, I don't know anything. You can use things to your advantage."* (Ward A, Nurses 2-3)

Conversely other nurse participants reported delaying a medical emergency response to wait for permission from the treating medical team to avoid negative consequences, even when there was clear evidence of patient clinical deterioration and they were mandated by hospital procedure to initiate an emergency response.

> *"…the teams will get frustrated if we called a code on their patient who's got a BP of 80, systolic or whatever. They will so that's generally why we don't unless we've triple checked it…"* (Ward B, Nurse 4)

There was also evidence of a senior medical officer's deviation from institutional procedures, causing anxiety for the caring nurse.

> *"I had the…surg[ical] reg[istrar] standing there all night with me, and three times I said to him I want to call a code. He's like what's the point. …I sat on him for three hours and at the end of my shift I was more annoyed at myself that it took me three hours to call a code…"* (Ward A, Nurse 8)

3. Confidence to respond

Overlapping with previous themes, lack of confidence to respond played a significant role in the delayed management of patient clinical deterioration by nurses and junior medical officers. Junior

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nurses reported feeling compelled to seek a second opinion from the 'in-charge' (the senior nurse coordinating the shift), to 'talk-out' their decision-making and have it validated before activating an emergency response.

> *"I'm technically a junior staff…you can usually go to the in-charge and say, can you please just look at my patient, or what do you think? Look at the obs. What should I do? I'm not sure what to do…..even if I knew I needed to escalate, I would ask and say, are you happy for me to this?"* (Ward A, Nurse 3)

However, this approach was not always successful:

> *"…the junior nurses… escalated the concern and the senior nurse has shot them down and said no, you don't have to worry about that."* (Ward B, Nurse-led Emergency Response Team member 1),

contributing to underreporting of patient clinical deterioration.

> *"It was only at changeover that someone was like, why is this blood pressure so low? …she didn't feel confident enough to say to someone 'I'm worried about this patient'."* (Ward B, Nurse 13)

While many nurses reported using their "*gut-instinct"* (Ward A, Divisional Nurse Manager 1; Ward B, Nurses 1, 2, 4) to guide decision-making:

> *"….it's not just the numbers. You can look at your patient and you…just know."* (Ward B, Nurse 1),

they quickly learned they needed to approach medical officers with vital signs data to demonstrate clinical deterioration in their patient.

> *"The doctors on those ward rounds…want more of a trend…They're not looking for subtleties…."* (Ward A, Nurse 1)

This requires clinicians to develop skills to be able to succinctly communicate concerns in a way that conveys the importance of the problem as explained by senior nurses.

> *"…this is about understanding other people's pressures, understanding language. Understanding who we're ringing and why we're ringing."* (Ward A, Nurse-led Emergency Response Team member)
>
> *"I've improved that over the last 10 years…the way that I speak to a senior person about what's wrong tends to be more in that SBAR [Situation, Background, Assessment, Recommendation: a communication framework used in health settings] …"* (Ward B, Nurse-led Emergency Response Team member 1)

Workload pressures contributed to delayed decision-making by junior clinicians as they:

> *"… never really know the full story and…on ward call you're so busy that you don't really have time to sit down and tease through the notes and find out exactly what the treating team wants…."* (Ward A, Junior Medical Officer 1).

Additionally, the:

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"...fear of looking stupid, and the fear of not being able to deal with it themselves… they are seen to have to be able to handle whatever comes their way." (Ward A, Nurse-led Emergency Response Team member),

may have contributed to delays. Nurses therefore referred concerns to the on nurse-led emergency response teams to discuss their concerns.

"....anybody can call us at any time of the day or night if you're concerned about your patient. So then that opens that opportunity [for a] grad nurse, one, two year grad nurse… can still call the [Nurse-led Emergency Response Team]." (Ward B, Nurse-led Emergency Response Team member)

4. Knowledge, skills, education and training

Policies for recognising patient deterioration and initiating a medical emergency response (also referred to as 'Code Blue') were not well utilised by nurse participants. One senior nurse suggested most policies are:

"...quite difficult to understand… If it's on a computer and it's eight pages long, it's very difficult to get what you need as a clinician…." (Ward A, Nurse-led Emergency Response Team member)

While some junior nurse participants were not aware of a medical emergency response policy, most reported relying on the colour-coded assessment data collection form (either paper-based or electronic) to guide their decision-making about responding to patient clinical deterioration.

"...if it's yellow, then you need to escalate and notify medical and nursing staff, so your nurse in charge and medical staff. Then if it's orange, then you have to call the code unless they've got modified criteria that a reg[istrar] has put in…" (Ward A, Nurse 2)

Most clinicians interviewed (nurses, medical officers and allied health professionals) expressed a desire for more education and training related to clinical deterioration to ensure their patients received the best quality care.

"...I don't think I have enough knowledge.....I feel that now I've stepped into this more senior role, I actually need to increase my knowledge on these things because people come to you with many questions, including deteriorating patient questions and sometimes I don't know the answers." (Ward A, Nurse 4)

However, frustration was expressed about the limited availability of training and education options, often *"booked out"* for months in advance, sometimes for *"a year and a half"*, and/or scheduled at inconvenient times (Ward A, Nurses 2-3).

Educational support for junior medical officers was also sparse. One participant reported relying on other junior medical officer colleagues for support and advice when patients in their care were clinically vulnerable.

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"Well, I suppose if you've got an unwell patient, you're not quite sure what's going on with them exactly, then you'd use your colleagues, either from other teams or from ICU or a med reg. Or, if it falls outside of your field of practice…I would use those other teams to help me guide as to how to manage that patient." (Ward B, Junior Medical Officer 1)

Professional boundaries within education and training occurred at both study sites; a barrier acknowledged by the member of the nurse-led medical emergency response team.

"We don't train from a multidisciplinary perspective about how to deal with each other, when things aren't going right." (Ward A, Nurse-led Emergency Response Team member)

5. Culture

Participants identified positive ward cultures as having a "*a good leader to enable you…"* (Ward A, Divisional Nurse Manager 1), such as the [ward] nurse manager and other senior clinicians who facilitated positive work-behaviours and promoted teamwork within and between the professional groups to ensure safe, quality patient care.

"[The ward nurse manager is] very approachable and…has the open-door policy. ….when you tell her something, she does something about it." (Ward A, Nurses 2-3)

However, the impact of working with difficult personalities was also raised by both medical officers and nurse participants.

"…there's a way that you can get around difficult people and…you shouldn't be disheartened…you need to think about your patient I guess and you need to keep trying." (Ward A, Junior Medical Officer)

"….that's one of the inconsistencies with how the clinical teams or how people work together…sometimes it's just personality based." (Ward B, Nurse-led Emergency Response Team member 1)

"…some people have that personality that's not approachable." (Ward A, Nurses 5-6)

Familiarity was an important component in developing good team relationships.

"…there was a period of time where there were just new graduate nurses coming out and they were really green. So, I was teaching them some things… I guess it's just helping each other out and yeah, teaching each other." (Ward A, Junior Medical Officer)

However, leadership changes, rotating of medical staff, and casual nursing staff also disrupted the flow of the shift, impacting patient.

"…it's hard, because we rotate through doctors all the time, so you can't - it's hard to build a rapport with someone." (Ward A, Nurses 2-3)

"We have a lot of pool [casual] staff on our ward…A lot of agency staff. We have [ward] nurse managers coming and going constantly. We have 'in-charges' that are fresh out of

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their grad programs. So…yeah, the ward - definitely dynamics change constantly." (Ward B, Nurse 3)

6. Emotions

Nurses expressed guilt, shame and rejection following episodes of clinical deterioration where an error or delay may have contributed to a poor outcome for a patient.

"I think I was a bit too slow initially to really back my judgement…I was guilty of delaying things…" (Ward A, Nurse 1)

They also expressed disappointment and frustration when patient outcomes were adversely impacted due to delayed medical intervention.

"I lost a lot of confidence. I needed debriefing over that to be very honest because I felt like I pushed for days….I knew in my gut that something wasn't right and I felt very, very un-validated and unheard" (Ward B, Nurse 3)

" I was so overwhelmed…I cried..." (Ward A, Nurses 5-6)

Debriefing with senior nurses and informal debriefing with colleagues enabled nurses to process and recover from these complex feelings.

"...generally we all...have a whinge with each other in the medication room, because it makes you feel better then and there and then you go back. We sort of debrief with each other." (Ward A, Nurses 2-3)

7. Environment

Clinicians found the layout of their respective ward settings impacted communication and made it difficult to monitor their patients' condition and to find colleagues.

"…single rooms are good in some ways because patients aren't being disturbed by the other patients in the room. But from a nursing aspect I mean I could walk into a six-bedded bay and I could just - with one quick glance I could basically tell the condition of the patients in the room. …. Whereas now you've got to go from room to room." (Ward B, Nurse 3)

However, the use of personal communication devices was overcoming this barrier in Ward A.

"I really like Vocera. It's like a very small device that you wear…You can have a speakerphone type call… You can also locate people with that." (Ward A, Nurse 7)

The process of mapping these inductive themes to TDF domains via a deductive analysis is represented in **Table 3**.

Discussion

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Seven themes identified barriers and facilitators to recognition and response to patient clinical deterioration by clinicians in two clinical settings: 1) information transfer; 2) ownership of the patient; 3) escalation of the patient; 4) knowledge and skills; 5) culture; 6) emotion; and 7) environmental contexts and resources. These inductive themes were able to be mapped deductively to TDF domains. The most common domains identified were social/professional role, identity and environmental contexts and resources, belief about capabilities, and social influence (Cane et al., 2012; Michie et al., 2005).

Health organisations continue to be hierarchical in nature with a focus on professional identity (Mackintosh et al., 2014). Where professional identity is rigid it specifies a set of behaviours and beliefs that contribute to professional boundaries. These boundaries constrain or delay information transfer of patient clinical deterioration between and within professional groups, representing a significant barrier to patient safety. Oriented around medical specialisations, healthcare workers' professional role and identity continues to conform to traditional methods of communication where juniors refer to their seniors via a structured process similar to a military ranking system (Mackintosh et al., 2014). These pre-determined communication steps also have significant resource implications as they are time-consuming and unadapted to fast-paced, multi-tasking clinical environments that rely on effective communication strategies and agile work environments (Gonzalez-Martinez et al., 2016). In these environments, verbal information sources are preferred as a collaborative decision-making approach, particularly when clinicians are faced with uncertainty. It is therefore unsurprising nurses in this study preferred fast verbal information transfer with credible, senior nurse colleagues, to report physiological cues of early patient clinical deterioration (Marshall et al., 2011). Subsequently, formal and legally mandated documentation was often completed retrospectively, at the end of a busy shift when nurses' memory, attention and decision-making was at its most impaired; increasing their professional vulnerability due to inaccurate and/or incomplete reporting.

Professional identify also influenced decisions about patient care. While clinicians are professionally required to ensure patient safety, our study showed a clear demarcation in the management of patient care according to rank. For example, senior nurses used their social influence to act as conduits between junior nurses and medical officers during medical rounds, reporting patient clinical deterioration or requests for medical review. This approach was effective during business hours but became less reliable after hours or on weekends when there was a reduced presence of senior nursing staff and often only one medical officer on duty responsible for all the wards in the division. The reduced capability of senior medical and nursing decision-makers contributed to tension between junior nurses and medical officers and anxieties around professional role, competence and organisational policy. It is therefore not surprising medical emergencies after-hours are associated with increased ICU admission and in-hospital mortality (Molloy et al., 2018). Nurse participants identified reduced access to senior nursing or medical staff for advice about deteriorating patients contributed to delayed decision-making; increasing the risk of an adverse event (Braaten, 2015; Chua

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et al., 2020). As a result, nurses at both participating sites preferred to refer concerns to their respective nurse-led emergency response teams due to their approachability, accessibility, and knowledge; identified by researchers as key attributes for patient safety (Aitken et al., 2015).

Evidence-based clinical policies guide care in health settings and set the agenda for patient outcomes and scope of professional role (Gherardi, 2019). However, policies cannot always guide decision-making at times of uncertainty (that is, where context does not fit existing models) (Lane & Maxfield, 2005; Travaglia et al., 2016). In this study, uncertainty resulted from differences in clinical decision-making around medical emergency responses between nursing and medicine (Elmufdi et al., 2018). These differences in professional identity and perceived capabilities were characterised by workarounds, pushbacks and modification of policy directives for an emergency response; which are well-documented phenomena (Braaten, 2015; Chua et al., 2020; Chua et al., 2017; Douglas et al., 2016; Elmufdi et al., 2018). For example, nurses used policy to pressure junior medical officers to review patients and make decisions about escalating care (Chua et al., 2020; Douglas et al., 2016), or delayed their response to patient deterioration to justify escalation to senior staff (Braaten, 2015; Chua et al., 2020; Chua et al., 2017; Elmufdi et al., 2018). So too junior doctors would underuse medical emergency response teams without first consulting their seniors (Chua et al., 2020; Elmufdi et al., 2018).

Junior nurses and doctors in this study lacked the professional confidence to make decisions about patient clinical deterioration in the absence of senior decision-makers. For novice clinicians, traditional training methods demand heavy and stressful workloads with the first year of practice, which is considered a time when learning is generalised with a focus on tasks, project management and identity formation (Sheehan et al., 2012). While essentially learning 'on the job', there is often an unreasonable expectation that junior nurses and doctors have the skills, capability and confidence to immediately handle situations, know what is wrong with their patients and how to manage their care (Braaten, 2015; Sheehan et al., 2012). As a result, looking stupid and fear of making unnecessary medical emergency calls are persistent themes in both nursing and medical literature (Braaten, 2015; Chua et al., 2017; Douglas et al., 2016; Massey et al., 2014).

Participants in this study openly acknowledged their lack of clinical knowledge related to physiological changes and organisational policy related to patient clinical deterioration. An important component of having the professional confidence to respond to patient clinical deterioration requires junior clinicians develop effective assessment and reporting skills to provide factual and timely evidence that is quantifiable and unambiguous. Oritz (2016) suggests development of self-confidence is a dynamic process that requires a strong emphasis on communication, relationship building, positive feedback and learning from mistakes. However, a supportive environment to nurture these skills is not always guaranteed due to organisational contexts, resulting in junior staff feeling unsupported, isolated and stressed (Hoffman & Bonney, 2018; Hunter & Cook, 2018).

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Where there is a lack of support from colleagues or senior staff, development of skills in interpreting and communicating patient clinical deterioration may be delayed. This may explain an over-reliance on an intuitive sense (or 'gut-feeling') that something is wrong, and reluctance or inability to use precise medical language, as expressed by some nurse participants in this study. Furthermore, it reinforces traditional professional boundaries at the cost of patient safety. As highlighted by nursing participants at both sites, the decision to not escalate was influential if it came from a medical officer regardless of physiological evidence of patient clinical deterioration and policy guidelines to escalate care (Elmufdi et al., 2018).

While clinician roles adapt to increasingly complex organisational contexts, and patients and health consumers demand greater involvement in the delivery of care services (O'Shea et al., 2019), training methods for newly graduated nurses and doctors continue to be outdated and compartmentalised. Many of the clinicians interviewed expressed a desire for more skill development, practice and assessment related to recognition and response to patient clinical deterioration. However, a number of barriers were identified by participants including a lack of face-to-face training workshops offered, difficulties offering training around clinical shifts and a lack of interdisciplinary training.

Interdisciplinary teamwork is acknowledged as a key attribute of high performing hospitals (Taylor et al., 2015); one that builds and maintains a patient safety climate (Manojlovich et al., 2014). However, study results identified compartmentalisation between professional groups, where outdated attitudes, biases and practices were maintained and the potential for mutual recognition of professional skills and capabilities lost (Braaten, 2015; Chua et al., 2020; Douglas et al., 2016; Massey et al., 2014). This makes effective relationships between junior doctors and nurses difficult to establish, impacting the quality of teamwork and timely communication related to patient clinical deterioration.

Understanding social influences is necessary to enable adaptation to context. Interdisciplinary training at an undergraduate level may help establish collaborative relationships. A recent study reported positive student assessment of an 'Interprofessional Health Care' bachelor program where students from a range of health professions were educated together (Mahler et al., 2018). Students developed an understanding of their colleagues' professional role, enabling them to recognise stereotypes and overcome prejudices (Mahler et al., 2018). This type of educational approach may offer better results in improving group identity between health professionals, and promote shared ownership and individual responsibility from all members of the team (Wakeam et al., 2014).

The primary responsibility for nurses and doctors is the ethical care of the patient (International Council of Nurses., 2012; World Medical Association., 2018). Nursing has a strong focus on ethical care that extends beyond the individual to families, groups and communities. Emotion is considered an essential component of this ethical approach (Benner et al., 2009), that influences skill development, practical experience and decision-making (Acebedo-Urdiales et al., 2018). However,

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where there is disordered organisational culture and or emotional barriers such as shame and rejection, nurses can experience moral distress (Sadooghiasl et al., 2018). This is particularly damaging for graduate nurses, where professional role expectations, time constraints and cognitive overload resulting from fear and anxiety are constant barriers (Sadooghiasl et al., 2018). Moral distress was expressed by nurse participants from both study sites who described their frustration, disappointment and guilt for delaying a response to patient clinical deterioration. However seeking support from and debriefing with nursing colleagues enabled professional learning from the negative experience and promoted beliefs about capabilities via a process of reassurance and validation (Clark & McLean, 2018). Widely used in other sectors such as the military and aviation, debriefing provides an opportunity to improve professional confidence and competent delivery of care within teams (Gardner, 2013). Junior medical officer participants in this study made no mention of debriefing, suggesting a missed opportunity for interdisciplinary learning and collaboration.

Study participants reported a lack of regular interdisciplinary training and education related to: 1) assessment of physiological cues; 2) patterns in conjunction with electronic or paper-based assessment metrics; and 3) recognition of cognitive biases that may lead to delayed or failed response to patient clinical deterioration (Elmufdi et al., 2018; Wakeam et al., 2014). This suggests resources allocated to traditional didactic education and training models no longer meet clinician demand. While this has implications for clinician competence and patient safety more broadly, alternative training options such as 'just-in-time training' may provide cost-effective learning for infrequently performed clinical procedures, such as patient clinical deterioration (Peebles et al., 2020). Used in aviation and manufacturing, 'just-in-time training' can take place at the bedside rather than removing staff from the workplace, and be interdisciplinary in its approach (Peebles et al., 2020). Further it can provide an engaging educational encounter with clinicians, where learnings can be shared and discussed; an alternative to the growing trend of mandatory often solitary online learning.

Hospital design is increasingly focused on ensuring patient privacy and comfort with single rooms (Reiling et al., 2008). While this can facilitate a more restful patient experience, single rooms can isolate patients and nurses, resulting in communication and workflow barriers (Chaudhury et al., 2006). As a result, nurses may find it difficult to quickly recognise and respond in the same way that was possible in shared bed-spaces. Increasingly, wearable smart devices are being used to facilitate communication. A literature review of smart devices in inpatient practice settings by August and Belliveau (2015), found the speed and quality of communication increased and improved with mobile devices - particularly for urgent issues – but also increased interruptions. While personal communication devices referred to by nursing participants in this study were viewed positively, they were not used by all members of the multidisciplinary team, notably medical officers, reducing their effectiveness during clinical deterioration events.

Strengths and limitations

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A strength of this study was the contrast between the two hospital sites and their differing organisational structures, clinical procedures, and health record documentation systems. Use of the TDF also enabled systematic examination of the factors that influenced behaviours within these respective contexts.

This study achieved reasonable representation of professional groups, although researchers struggled to recruit senior medical staff. We also struggled to recruit patients and/or family members with direct experience of care from each study site. Although health consumers and family member representatives were remunerated for their participation, they faced time and access barriers that limited participation. While their involvement is important in shaping policy, the 'relevance' of patient and family member participation may not have been clearly articulated in this study, as recommended to enhance engagement (McKenzie et al., 2016).

Conclusions

Using a theoretically informed behaviour change framework, this study findings contribute to furthering our understanding of the barriers and facilitators that influence clinicians' timely recognition and response to patient clinical deterioration. While contextually focused, this knowledge can inform behavioural change interventions to improve management of patient clinical deterioration.

Relevance to clinical practice

Our increasing understanding as to why clinicians delay responding to patient clinical deterioration is relevant to all health settings. Results from this study suggest traditional hierarchies contribute to disordered organisational culture that can lead to suboptimal outcomes for patients and the emotional distress for clinicians. This highlights the importance of promoting regular interdisciplinary training and collaborative decision-making, supporting junior clinicians, and improving communication practices.

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Table 1: Interview guide topics categorised to domains of Theoretical Domains Framework.

	TDF Domain†	Semi-structured Interview Topic
1	Knowledge	Knowledge and understanding of emergency response procedures
2	Skills	Confidence and practice of skills in using the emergency response procedures
3	Social / professional role and identity	Understanding the purpose of emergency response procedures and the requirement of professional behaviours and qualities when interacting with colleagues and patients
4	Beliefs about capabilities	Perceived ease or difficulty in implementing emergency response procedures
5	Optimism	Perceived confidence in the relevance and usefulness of the emergency response procedures
6	Beliefs about consequences	Beliefs about consequences (to organisation, colleagues and patients) of not reporting/reporting clinical deterioration
7	Reinforcement	Organisational and collegial factors that motivate accurate recognition, response and documentation of deterioration
8	Intentions	Recognised benefits of expeditious application of emergency response procedures versus costs of delayed action.
9	Goals	Personal, ward, and organisational priorities for reporting and documentation clinical deterioration
10	Memory, attention and decision processes	The need to maintain knowledge and skills related to management of clinical deterioration
11	Environmental context and resources	Environmental elements such as resources, ward layout, culture, and social context, that influence respond to clinical deterioration
12	Social influences	Personal biases, opinions or social factors that influence response to clinical deterioration
13	Emotion	Emotional responses evoked by clinical deterioration
14	Behavioural regulation	Utilising professional and clinical knowledge to identify areas for improvement in relation to reporting clinical deterioration

†For definitions refer to Cane et al. (2012)

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Table 2: Clinicians' characteristics.

Characteristics	Ward A	Ward B	Total Sample	
	***n* = 14**	***n* = 18**	***n* = 32**	**%**
Age, median (IQR)	29.5 (25)	30 (11)		
Years of practice, median (IQR)	5 (12)	5 (6)		
Gender				
Female	12	12	24	75
Male	2	6	8	25
Role				
Endorsed enrolled nurse	1	1	2	6
Registered nurse	5	9	14	44
Facilitator / Clinical nurse	2	1	3	9
Nurse educator	1	0	1	3
CNC†	1	2	3	9
Division Nurse Manager	2	0	2	6
Medical, resident	1	1	2	6
Medical, registrar	0	1	1	3
Allied	1	3	4	13
Highest qualification				
Pre-baccalaureate diploma	1	1	2	6
Baccalaureate degree	8	11	19	60
Post-baccalaureate specialty qualification	4	4	8	25
Masters	1	2	3	9
Work Status				
Full-time	9	9	18	56
Part-time	5	9	14	44

†Clinical Nurse Consultants, including nurse-led emergency responders.

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Table 3: Mapping inductive to deductive.

Themes	Inductive analysis following moderation process	Deductive analysis using TDF
1. Information transfer	Hierarchical communication -Monopolisation of information sources	Social/professional role and identity (professional identity, professional boundaries)
	Assumption of knowledge about the patient	Knowledge (including knowledge of condition/scientific rationale)
	Preference of verbal communication Cognitive overload	Memory, attention and decisional processes (cognitive overload/tiredness)
	Time constraints	Environmental contexts and resources (resources/material resources)
2. Ownership of patient care	Tension between nurses and junior medical officer about decision-making	Social influence (intergroup conflict)
	Senior medical officers ultimately responsible for patient management and decision-making.	Social/professional role and identity (professional role, professional confidence, professional boundaries)
	Junior medical officers reluctant to act in the absence of senior medical officers	Belief about capabilities (perceived competence)
	Frustrating for nurses who are mandated by policy to respond to patient deterioration and seek medical review	Social/professional role and identity (professional role, professional confidence, professional boundaries) Beliefs about consequences (anticipated regret)
	Anxiety about support after hours	Environmental context and resources (organisational culture/climate)
	Anxiety about managing 'outlier' patients.	Social/professional role and identity (professional role, professional confidence, professional boundaries)

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		Belief about capabilities (perceived competence)
	Nurses over-ride junior doctors using policy	Reinforcement (consequents) Social influences (social pressure, power)
	Purposeful deviation from policy	Reinforcement (consequents) Belief about consequences (anticipated regret)
3. Confidence to respond	Lack of confidence to respond to patient clinical deterioration by nurses and junior doctors	Social/professional role and identity (professional identity, professional confidence) Belief about capabilities (self-confidence)
	Deficient communication skills to convey concerns. Requires experience and practice	Skills (skills development, interpersonal skills, practice)
	Workload pressures contribute to delays	Environmental context and resources (organisational culture/climate)
	Fear of looking stupid, of not managing	Emotion (fear, anxiety)
4. Knowledge and skills	Policies not well utilised, difficult to understand	Memory, attention and decisional processes (attention, cognitive overload/tiredness)
	Desire for more education and training	Knowledge (including knowledge of condition / scientific rationale, procedural knowledge, knowledge of task environment) Skills (skill development, competence, interpersonal skills, practice, skill assessment)
	Lack of education and training opportunities	Environmental context and resources (resources/material resources)
	Lack of multi-disciplinary training	Social/professional role and identity (professional identity, professional boundaries)
5. Culture	Leaders determine good or bad workplace culture	Social influence (social support, power, intergroup conflict)
	Short-terms rotations impact	Environmental context and resources

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	relationship building	(organisational culture/climate)
6. Emotion	Negative emotions following poor outcomes for patients due to error or delay	Emotion (anxiety, stress, depression, negative affect)
7. Environmental context and resources	Layout of clinical setting impact communication	Environmental context and resources (person x environmental interaction)

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