

ACCEPTED VERSION

Lisa Thiele, Arthas Flabouris, Campbell Thompson

Acute clinical deterioration and consumer escalation in the hospital setting: a literature review

Resuscitation, 2020; 156:72-83

© 2020 Elsevier B.V. All rights reserved.

This manuscript version is made available under the CC-BY-NC-ND 4.0 license

<http://creativecommons.org/licenses/by-nc-nd/4.0/>

Final publication at: <http://dx.doi.org/10.1016/j.resuscitation.2020.08.011>

PERMISSIONS

<https://www.elsevier.com/about/policies/sharing>

Accepted Manuscript

Authors can share their [accepted manuscript](#):

12 Month Embargo

After the embargo period

- via non-commercial hosting platforms such as their institutional repository
- via commercial sites with which Elsevier has an agreement

In all cases [accepted manuscripts](#) should:

- link to the formal publication via its DOI
- bear a CC-BY-NC-ND license – this is easy to do
- if aggregated with other manuscripts, for example in a repository or other site, be shared in alignment with our [hosting policy](#)
- not be added to or enhanced in any way to appear more like, or to substitute for, the published journal article

16 June 2022

<http://hdl.handle.net/2440/129438>

Acute Clinical Deterioration and Consumer Escalation in the Hospital Setting: A Literature Review

Corresponding author: Lisa Thiele. The University of Adelaide, Faculty of Health and Medical Sciences, Adelaide Medical School, North Terrace, Adelaide 5000, South Australia, Australia. Registered Nurse, Intensive Care Unit, Royal Adelaide Hospital, Adelaide 5000, South Australia, Australia. Email: Lisa.Thiele@sa.gov.au

Associate Professor Arthas Flabouris. Staff Specialist, Intensive Care Unit, Royal Adelaide Hospital, and Clinical Associate Professor, The University of Adelaide, Faculty of Health and Medical Sciences, Adelaide Medical School, North Terrace, Adelaide 5000, South Australia, Australia. Email: Arthas.Flavouris@sa.gov.au

Professor Campbell Thompson. Consultant, Acute Medical Unit, Royal Adelaide Hospital, and Professor of Medicine, The University of Adelaide, Faculty of Health and Medical Sciences, Adelaide Medical School, Discipline of Medicine, North Terrace, Adelaide 5000, South Australia, Australia. Email: campbell.thompson@adelaide.edu.au

ABSTRACT

BACKGROUND: Consumer escalation systems that allow patients and/or their family/carers to escalate concerns about clinical deterioration have been proposed as a way of enhancing patient safety. However, evidence to guide implementation or to support system effectiveness remains unclear. **AIM:** to critically evaluate the current evidence surrounding consumer escalation within the context of clinical deterioration to identify the strengths, weaknesses and gaps in existing knowledge, essential themes, and directions for further investigation. **METHOD:** database searches were conducted within Cumulative Index of Nursing and Allied Health Literature, PubMed, and the Cochrane Library for articles directly relating to consumer escalation systems published, in English, within the previous 10 year-period. Titles and abstracts were screened and relevant full-text articles included. Content was examined to identify breadth of knowledge, essential themes, and the effectiveness of current systems. **RESULTS:** 27 articles, containing a mixture of both quantitative and qualitative findings, were identified. Within the context of limitations in the overall depth and quality of current evidence, four key areas (relating to consumer understanding and awareness of clinical deterioration, confidence and ability to escalate concerns, education, and staff attitudes) were identified as potentially critical to the foundation, functioning, and success of consumer escalation systems. Consumer escalation processes may contribute positive effects beyond mortality rates; however, an agreed method of assessing effectiveness remains undetermined. **CONCLUSIONS:** the ability of consumer escalation processes to achieve their underlying goals is still to be adequately assessed. Further research is required to inform how to best implement, support and optimise consumer escalation systems.

Word count:

3,995 words (excluding abstract, figures, tables and reference list)

INTRODUCTION

Clinical deterioration is a worsening physiological state that compromises the body's ability to maintain homeostasis, thereby increasing the risk of organ dysfunction, morbidity, and death.^{1,2} Its occurrence may be secondary to an underlying medical condition, development of a new medical issue, or a complication of clinical care.^{1,3} With evidence suggesting indications of clinical deterioration are often present in the hours preceding adverse events, such as cardiac arrest,^{3,4} early recognition and management is essential.^{4,5}

This knowledge has led to the implementation of clinician triggered rapid response systems (RRS)⁵ directed at ensuring patients who have, or are at risk of, clinical deterioration receive timely and adequate interventions.^{6,7} However, delays and failures to recognise and/or respond appropriately continue to occur.⁸⁻¹² Such deficiencies have been associated with negative patient outcomes including prolonged hospitalisation,¹³ unplanned admissions to intensive care, and increased morbidity¹² and mortality.^{9,13,14}

As has been highlighted through coronial findings and incident investigations,¹⁵⁻¹⁹ healthcare consumers (that is patients and their family/carers) can, potentially, have a role in facilitating the early identification and reporting of clinical deterioration,^{17,20-23} as a familiarity with a patient's typical state and behaviours may allow the capacity to identify early subtle changes.^{15-17,22,24-26} On this basis, consumer escalation (CE) systems have emerged as a potential complement to existing RRS.^{15,25} However, despite support from international healthcare organisations,^{8,16,27,28} and being linked to hospital accreditation,^{8,29} the introduction of CE has occurred in the absence of robust research-based evidence.^{15,20}

If CE systems are to be effective, a comprehensive understanding of the ability of consumers to recognise clinical deterioration, and the factors that potentially facilitate or inhibit consumers voicing concerns, is essential.¹⁵ The aim of this literature review is, therefore, to critically evaluate the current evidence surrounding CE within the context of acute clinical deterioration, to identify the strengths, weaknesses and gaps in existing knowledge, essential themes, and directions for further investigation

METHODS

Search strategy

Searches were conducted within the Cumulative Index of Nursing and Allied Health Literature, PubMed, and the Cochrane Library using the search strategy:

(deteriorat) AND (consumer OR patient OR relative OR family OR carer) AND (escalat* OR activat* OR initiate* OR response OR call) AND (team OR help OR system) NOT (home OR outpatient OR community OR simulation OR psychological)*

The truncation symbol (*) was utilised to expand the search in the case of root words.³⁰ Boolean operators were employed to minimise unrelated results³⁰ with NOT applied to retain attention upon the acute hospital setting and physiological, rather than psychological, deterioration. The reference lists of included papers were reviewed to ensure the inclusion of all pertinent sources.³¹

Eligibility criteria

Only full-text articles published in peer-reviewed journals, in English, were included. Although isolated examples of CE systems were first identified in 2005,^{32,33} the current review concentrated on papers published within the last 10 years (ending December 2019) to maintain a focus upon contemporary practice.³⁴

Content analysis

The breadth of current research was determined by examining the objectives, methods, and outcomes of included papers. Areas in which research and evidence existed (or was lacking) were identified, as were key themes considered critical to the foundation, functioning, and success of CE systems, namely:

1. Consumer understanding and awareness of clinical deterioration,
2. The ability and confidence of consumers to report concerns,
3. The importance of consumer education, and
4. The impact of staff attitudes.

Consideration was then given to the effectiveness of current systems and escalation system design.

RESULTS

Search results

27 relevant papers were ultimately identified (Fig. 1). Protocols for a proposed Cochrane Review³⁵ and a proposed qualitative systematic review³⁶ were not included as the final systematic reviews were yet to be published.

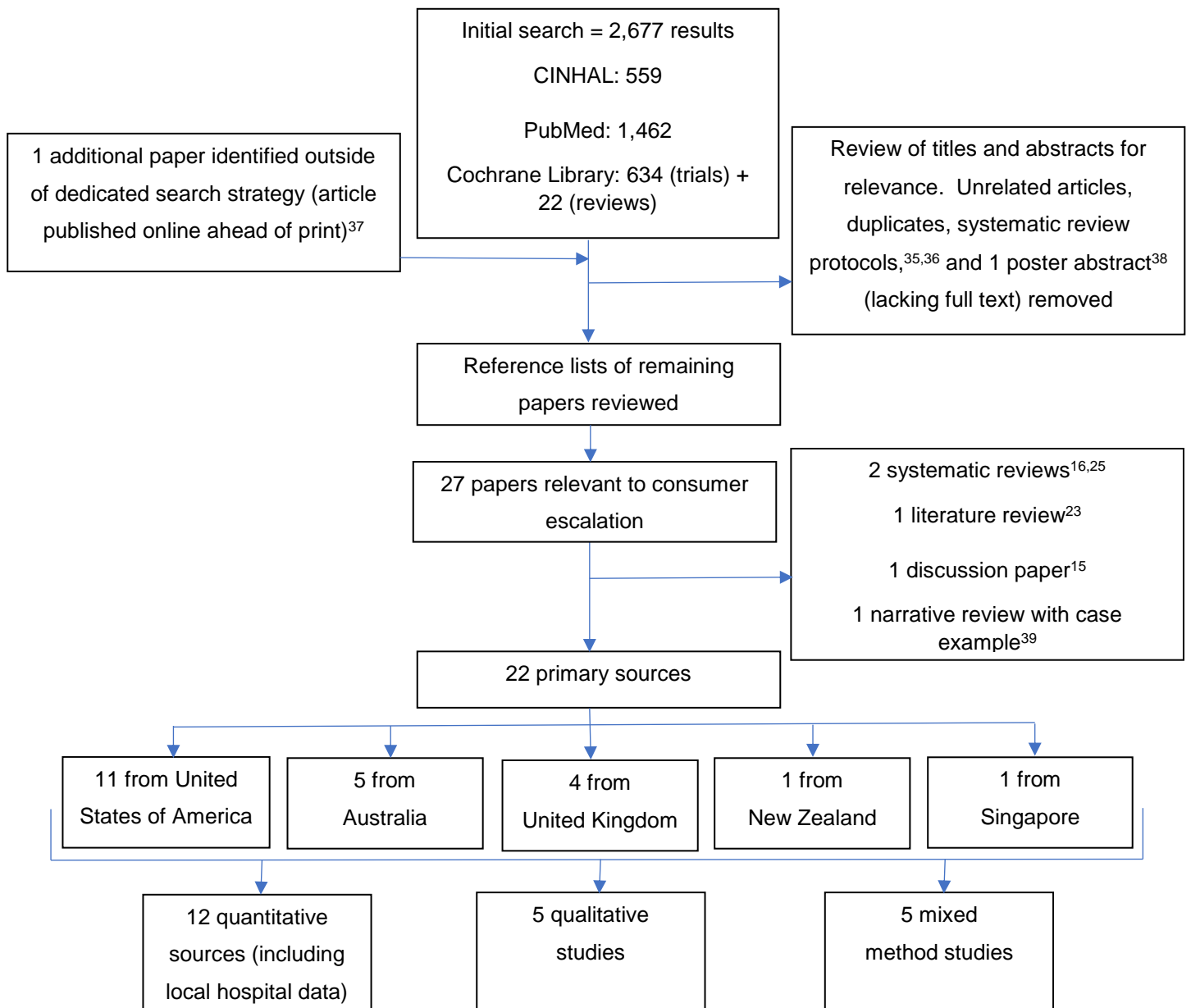


Fig 1. Flow diagram of literature search and selection process. Country of origin and data type included for primary sources

The distribution of broad topics (covered to varying depths and quality) across the literature is illustrated in Fig. 2. Several papers considered multiple subjects.

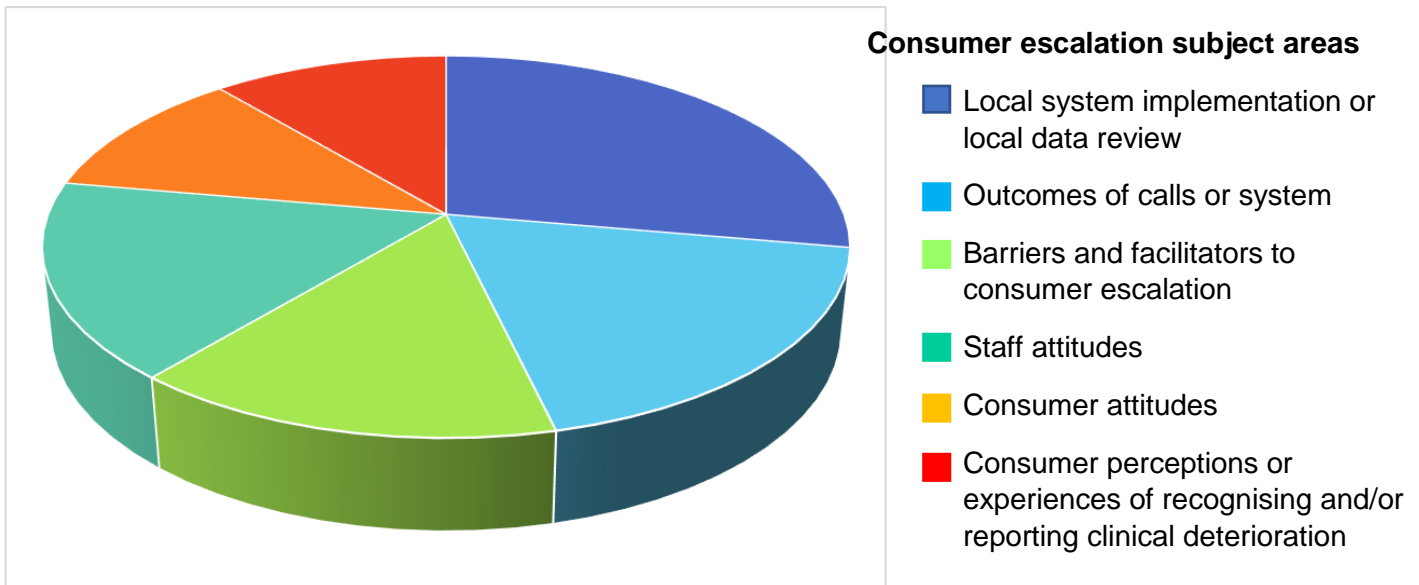


Fig. 2. Distribution of subjects across reviewed papers

Fig. 3 depicts the distribution of research in relation to patient population and date of publication. Articles published prior to 2009 were included to demonstrate the initial focus upon paediatric hospitals. Literature specific to adult populations first emerged in 2010.⁴⁰

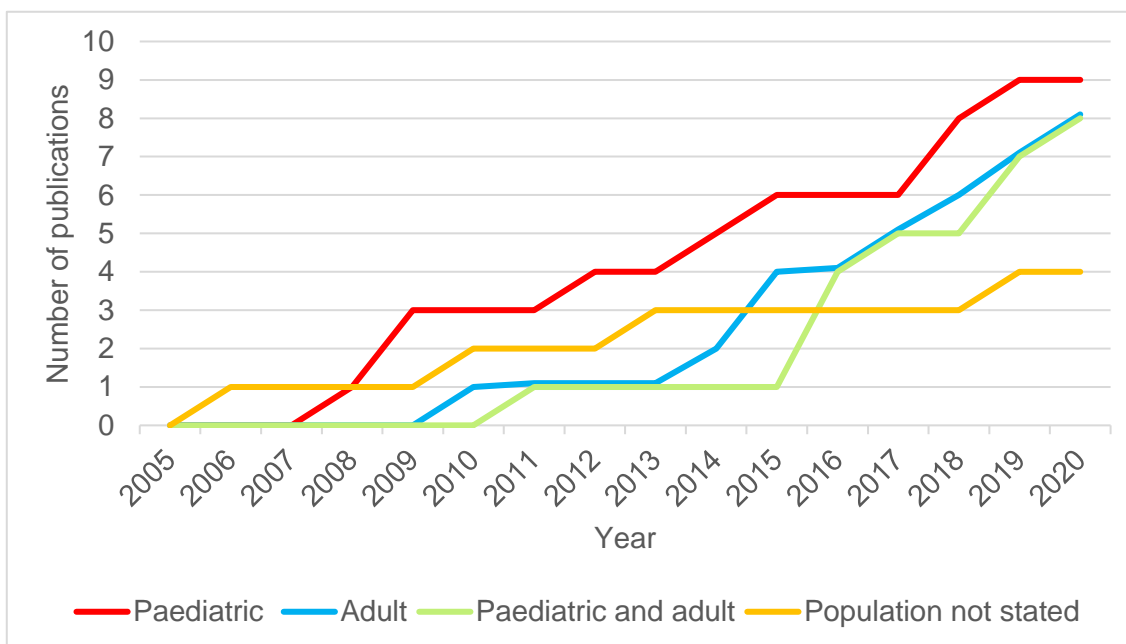


Fig. 3. Number of publications by patient population over time

Strength of evidence

With attention upon evidence-based healthcare, hierarchies of evidence have emerged.⁴¹ The Joanna Briggs Institute Levels of Evidence for Effectiveness⁴² was chosen for this review owing to the system's wider consideration of evidence, in comparison to other models.⁴¹ However, a proportion of the reviewed literature still remained outside of this hierarchy due either to a focus upon local service evaluations or paper design. A summary of findings (divided into patient populations) is provided in Table 1.

| Level | Number of papers | Paediatric | Adult | Paediatric and adult | Population not stated |
|---|------------------|---|--|---|------------------------------------|
| Level 1 Experimental design | 1 | | Level 1c (See ⁴³) | | |
| Level 2 Quasi-experimental | 0 | | | | |
| Level 3 Observational analytic design | 5 | Level 3c (Bavare ⁴⁴ Brady ⁴⁵) | Level 3e (Eden ⁴⁶ Gerdik ⁴⁰) | | Level 3e (McCawley ⁴⁷) |
| Level 4 Observational descriptive studies | 9 | Level 4b (Gill ^{26*} Gill ^{48*} Hueckel ⁴⁹ Ray ⁵⁰) | Level 4b (Odell ^{24*}) | Level 4a (Albutt ²⁵ Gill ¹⁶) Level 4c (Dwyer ^{51*}) | Level 4b (Bogert ⁵²) |
| Level 5 Expert opinion and bench research | 0 | | | | |
| Not considered within the Levels of Evidence for Effectiveness | | | | | |
| Local service evaluation | 3 | | | (Baird ⁵³ Odell ⁵⁴) | (Dunning ⁵⁵) |
| Qualitative studies | 5 | (Paciotti ⁵⁶) | (Guinane ²⁰ Rainey ²¹ Strickland ⁵⁷) | (King ⁵⁸) | |
| Other | 4 | Narrative review (Van Voorhis ³⁹) | Questionnaire pilot (Albutt ^{37*}) | Discussion paper (Gill ¹⁵) Literature review (Vorwerk ²³) | |
| <p>*mixed method study including both quantitative and qualitative components.</p> <p>Studies containing more than one design have been assigned according to the highest applicable level. Where design was not specifically stated by study authors, evaluation of the closest applicable level was considered upon reported methods and analysis approaches.</p> | | | | | |

Table 1. Level of evidence for effectiveness.

It is important to note that hierarchies of evidence based solely upon study design have limitations, as not all questions are amenable to experimental methodologies.⁴¹ This is arguably the case with CE where, for example, ethical considerations may impact upon the nature of research regarded as appropriate. Consequently, it is important to consider additional factors, such as quality and risk of bias, in evidence appraisal.⁴¹

Study quality

Quantitative studies were largely observational and/or descriptive, with focus upon system implementation within individual facilities. Concerns about the overall quality were identified with study authors self-reporting limitations including retrospective data collection (resulting in potentially missing information^{26,45,48,54} and an inability to investigate all contributing factors),⁴⁴ small sample sizes,^{24,44} and limited study duration.⁴⁹ Previous review findings^{16,23,25} also highlighted shortcomings in the quality of previous studies including failures to adopt rigorous research frameworks or to clearly state aims or objectives, justify methods, or provide detailed descriptions of data collection tools or analysis procedures and that simplistic outcome measures, restricted sample sizes, and a focus upon local quality improvement projects have limited the ability to generalise results. Insufficient study details and variations in CE calling criteria, activation mechanisms, and RRS team compositions have also impaired the ability to compare findings across the literature.^{16,25}

Qualitative studies^{20,21,58} more consistently provided in-depth justification for selected methodology, and descriptions of data collection and analysis methods. However, study authors still reported limitations including samples not reflecting ethnic diversity,^{21,57} potential sources of bias (secondary to sampling processes,²⁰ delays in data collection,²¹ and failures to confirm final findings with participants),^{21,57} and limitations to the transferability of results.^{20,21,56,57}

Study populations

Paediatric versus adult patients

Pooled data suggests that CEs occur more frequently amongst adult patients; yet, a greater proportion of paediatric patients require transfer to higher acuity care. An explicit examination of potential differences in the implementation, functioning and

success of CE between paediatric versus adult care settings, or the potentially differing roles and expectations of family between these two populations, has not occurred.

Consideration of diversity

The impact of physical conditions, such as visual and hearing impairments, upon system utility has, generally, been disregarded, as have the views of relatives of deceased patients, those who have experienced adverse healthcare events, and other vulnerable populations, including individuals with cognitive deficits.

Beyond isolated cases,^{47,50,57} reviewed studies largely overlooked non-English speaking individuals. Whilst examples exist of Government services providing information about consumer escalation in multicultural formats,⁵⁹ only three papers considered the impact of cultural backgrounds upon the willingness of consumers to escalate concerns.^{15,57,58} Although the authors concluded that cultural factors may prevent some consumers from voicing concerns⁵⁷ and challenging traditional models of healthcare,¹⁵ limited data was provided. Further research is required to ensure that CE services are meeting diverse needs of healthcare consumers,^{15,23} especially given growing cultural and ethnic diversity.⁶⁰

Key themes

Content analysis identified four key themes considered essential to the operation and success of CE systems:

Consumer understanding and awareness of clinical deterioration

CE systems are founded upon the belief that consumers can recognise clinical deterioration. However, no studies directly examined how consumers define clinical deterioration or consumer knowledge of physiological observations, and their values, in relation to this matter. Whilst one study⁵⁷ reported that 90% of 41 interviewed patients or family members had an awareness that either they, or their relative, had been clinically deteriorating, outside of providing a limited number of participant quotes, there was limited detail to support how awareness was assessed.

Suggestion exists that patients may subjectively sense changes in their wellbeing,³⁷ and that patients and families rely upon symptoms to identify a change in clinical status.^{20,21} Reported symptoms included shortness of breath,^{20,40} pain,^{20,45,46,54} altered

consciousness or mental state,^{40,45,54} nausea, dizziness, sweating, and those of feeling “unusual”²⁰ or “something just [not feeling] right”.⁴⁰ Participants in two studies^{21,57} reported previous symptoms and experiences with illness assisted in their recognition of clinical deterioration. In contrast, the presence of multiple symptoms from complex underlying medical conditions,²¹ normalising the expectation to feel unwell when hospitalised, and deficiencies in the medical knowledge of consumers, appeared to reduce consumer confidence in recognising clinical severity, and escalating care.^{20,21} The severity of a patient’s underlying illness and physiological deterioration may also, potentially, impact negatively upon their ability to detect deterioration and/or physically communicate concerns.^{20,21}

Disparity exists in the proportion of consumer-initiated calls related solely to clinical deterioration. Isolated studies reported that 75% (of 8)⁴⁷ and approximately 66% (of 49)⁴⁴ CEs related to medical emergencies or were in association with clinician RRS calling criteria, respectively. In contrast, statistics associated with the CE program, Ryan’s Rule, in Queensland, Australia, indicated that less than 3% of consumer calls would have triggered a clinical review, based upon the State-wide early warning scoring system.⁵¹ Only one study⁴⁴ directly compared the clinical status of patients at the time of consumer, compared to clinician, RRS activations. Calls initiated by consumers were of significantly lower illness acuity and less likely to progress to a cardiac or respiratory arrest. Whether this difference was related to an earlier recognition of deterioration by consumers remains unknown.^{15,44} Arguably, consumers and clinicians may also be assessing clinical concern in differing manners.⁵¹

The ability and confidence of consumers to escalate concerns

If CE processes are to be effective, patients and relatives require knowledge that such systems exist, and of the system’s purpose and activation mechanisms.^{15,45,48} Consumer awareness was shown to vary substantially across, and within, studies from approximately 6%^{26,50} to 98%.⁴⁹ Understanding of when and how to raise concern varied from 27%⁵⁰ to 80%.^{47,49}

The success of CE processes is also dependent upon consumers’ confidence to escalate concerns.⁴⁸ One study²⁶ reported that families of paediatric patients had sufficient confidence to escalate care. Yet, even within this study, conflicting views were noted, including the expected difficulties for parents to question staff. Other

studies have suggested that the presence of chronic medical conditions,^{20,44} and previous hospitalisation,^{20,44,50} may impart consumers with greater confidence owing to their own (or their relative's) familiarity with the medical condition and hospital system.^{20,50} However, such studies have either been retrospective,⁴⁴ lacked detail to support how their findings were obtained,⁵⁰ or had a small sample size.^{20,44}

Suggestion exists that consumers may have reservations about communicating concerns surrounding safety in healthcare,⁵⁸ including in voicing matters that may be perceived as challenging health professionals,⁴⁸ or traditional hospital hierarchies.^{26,48} Consumers were noted to be apprehensive that escalating concerns would risk upsetting ward-based staff,^{24,58} thereby damaging relationship with their healthcare team,^{16,26} with potential negative repercussions upon care.^{21,53} Consumers also reported the belief that they were insufficiently qualified to make clinical decisions or to question healthcare providers^{20,26} and the perception that staff were too busy to listen.^{21,48}

Consequently, it is expected that a proportion of consumers will not feel sufficiently comfortable to raise concerns about clinical deterioration.^{15,20,57} Recommendation therefore exists that, rather than expecting consumers to independently voice apprehensions, alternative approaches, including clinicians directly and routinely asking consumers about potential concerns, be considered.^{20,21,37,58} Further investigation remains required.³⁷

The importance of consumer education

Participants in one study⁴³ reported greater confidence in their own ability to identify and report symptoms associated with clinical deterioration following participation in a dedicated education program; however, the study did not examine whether an associated behavioural change resulted.

Other formal consumer education programs^{47,49} have been associated with increased levels of patient and family awareness and understanding of CE systems. In contrast, an absence of dedicated education was related to limited, and inappropriate, system utilisation.⁴⁷ Whilst highlighting the importance of effective education,^{49,52} challenges exist in reaching all healthcare consumers owing to the large numbers utilising hospital services⁵⁴ and the need for teaching to be ongoing.^{16,23,26,40,49,50,52,58}

Multiple methods of education delivery are recommended^{23,48,50,58} to maximise reach and comprehension, and to ensure sensitivity to the needs of individuals of varying age, backgrounds, emotional states, and health literacy.⁵⁸ Verbal explanation by clinical staff was identified as the most essential component^{48,50,58} and as a way of improving hospital culture towards consumer-centred care,^{48,49} whilst written text,^{23,58} posters,^{23,53,58} and mobile technology^{23,58} were suggested for providing reinforcement.^{23,58} The inclusion of consumers in education material development is recommended.⁵⁸

Although mentioned by some authors,^{15,48,58} the impact of health literacy upon CE processes has not been formally investigated. This is despite low health literacy being identified as a global issue,⁶¹⁻⁶³ associated with overall poorer health status, higher rates of hospitalisation,⁶⁴ and heightened risk of suffering adverse healthcare associated events.⁶³ Clear documentation exists from international patient safety organisations of the need to consider the impact of health literacy in patient safety,⁶⁵ partnering with consumers,⁶⁴ and in the implementation of CE systems.⁶⁶

The impact of staff attitudes

Of the eight papers that explored staff attitudes towards CE,^{24,26,47,48,50,51,52,56} only one made this their primary objective.⁵⁶ Whilst clinicians acknowledged that such systems may empower consumers, reduce complaints,²⁴ support the detection of clinical deterioration,^{24,26} and assist in improving patient care,⁵⁰ hesitations and negative staff attitudes were also noted.⁵⁶ Clinician concerns included that professional judgement, decision making and boundaries will be undermined^{23,24,26,50,56} and that ward-based staff will be de-skilled.²⁴ Clinicians also reported uncertainties of how to explain CE to patients and families,^{50,52} including concerns that such systems may imply an inability of the patient's own medical team to manage patient care⁵⁰ and consequently, discourage consumers from communicating concerns to their clinical team.^{26,50} Nursing staff feared potential loss of control over patients,⁵⁰ and of being judged negatively if the patient, for whom they are providing care to, escalated concerns.⁴⁷ This included fear of increased scrutiny of their practice²³ and of potential professional ramifications if they failed to detect a clinical change.^{16,26} Trepidations about potential increases in workloads were further noted.^{23,24}

Apprehensions were also reported that CE systems would burden family members, increase anxiety, and lead to feelings of guilt if family did not escalate concerns when a patient's clinical condition deteriorated.⁵⁶ Finally, reservations existed that consumers lack the medical knowledge to decide when it is appropriate to initiate a RRS call,⁵⁶ and consequently, may call for inappropriate, unnecessary or non-emergency reasons,^{23-25,39,40,47,48,50} thus overwhelming and misusing RRS resources.^{23,56}

To date, clinician unease about inappropriate calls, workloads, and the straining of resources have been largely unfounded.^{23-25,40,50} However, negative clinician attitudes do impact detrimentally upon CE function.^{48,51} Studies have reported nursing staff being selective in which families they provided information about CE to,⁴⁸ staff labelling consumer concerns as "complaints",⁵¹ and unfavourable staff attitudes contributing to clinicians failing to respond appropriately.⁵¹ Staff education highlighting the validity,³⁹ potential benefits,^{24,50} and safety^{23,26} of CE has been identified as critical to overcoming such negative perceptions.^{23,24,48,50}

Effectiveness of CE systems

An agreed method for measuring the effectiveness of CE does not yet exist. In regards to whether systems are being suitably used, systematic review findings¹⁶ reported that 99% of consumer-initiated calls across 10 studies were deemed, by study authors, as appropriate. However, only limited detail was provided to determine how appropriateness was assessed. The current literature review found that, within the context of variable calling criteria across different hospitals and studies,^{15,16,23} most cases of CE appeared justifiable on the basis of either enhancing patient safety, or care quality.^{15,16,23,45,54} However, cases were identified where consumers initiated calls for, what study authors classified as, "not valid concern"⁵³ or "nonsafety" related issues,⁴⁶ and situations where individual consumers made repeated calls.⁴⁶ Multiple studies also noted communication breakdowns between clinicians and consumers,^{16,24,25,51-54} in particular, for consumer concerns about the general administration of,^{16,23,25,44,53} and delays in, care,⁵⁵ as a frequent trigger for escalations. Although such concerns may have potential implications upon patient safety and care quality,^{23,47} achieving resolution through a RRS activation is arguably not the most suitable or resource-efficient approach.^{16,25,46} Educating consumers about indicators

of clinical deterioration,²³ and adopting tighter calling criteria,⁴⁶ may assist in enhancing system effectiveness.

Robust patient outcome data in relation to CE is lacking.^{16,25} Using the percentage of consumer-initiated calls that have resulted in patient transfers to a higher level of care (such as an intensive care unit,^{24,44-46,50} a higher acuity ward,⁵¹ or a metropolitan hospital)⁵¹ as a proxy for effectiveness, figures range substantially (Table 2). Potentially, this may be due to variations in hospital size, number of consumer-initiated calls, patient case mix, and the type of RRS. Of the 10 studies that reported this measure, an average of 5.5% of all consumer-initiated calls resulted in patient transfer. A further study examining patient outcomes post CE also reported that, of 367 cases, 1.6% were admitted to intensive care within the subsequent 24 hours.⁴⁶

| Paper | Study duration | Total number of consumer calls | Number transferred to higher level of care | % Transferred |
|--|----------------|--------------------------------|--|------------------|
| Bavare et al. ⁴⁴ | 3 years | 49 | 13 ⁺ | 27% |
| Bogert, Ferrell & Rutledge ⁵² | 13 weeks | 8 | 0 | 0% |
| Brady et al. ⁴⁵ | 4.5 years | 40 | 9 ⁺ | 23% [^] |
| Dunning et al. ⁵⁵ | 16 months | 30 | 1 [*] | 3% |
| Dwyer et al. ⁵¹ | 2 years | 57 | 9 [#] | 16% |
| Gill et al. ⁴⁸ | 6 months | 1 | 0 | 0% |
| Hueckel et al. ⁴⁹ | 12 weeks | 2 | 0 | 0% |
| Odell et al. ²⁴ | 6 months | 12 | 1 ⁺ | 8% |
| Odell ⁵⁴ | 7 years | 534 | 6 [*] | 1% |
| Ray et al. ⁵⁰ | 2 years | 2 | 2 ⁺ | 100% |

Transfer location: ⁺ = ICU, [#] = higher acuity ward or metropolitan hospital, ^{*} = not defined
[^]Brady et al.⁴⁵ reported 45 family-initiated calls; however, the authors based the percentage transfer rate upon the 40 cases for which full data from chart reviews were available
 Gerdik et al.⁴⁰ reported transfer rates following the introduction of consumer escalation; however, no separation was provided for consumer or clinician RRS referrals

Table 2. Consumer-initiated calls resulting in patient transfer to higher acuity care.

Whilst such transfer rates remain below those associated with clinician RRS activations (of up to 60%),^{44,45} they do highlight a potential subgroup of patients whose deterioration may have otherwise been overlooked.^{25,44,45} Furthermore, reports exist of consumer-initiated calls leading to modifications in patient management (including specialist review,^{51,54} additional investigations,^{46,51} clinical interventions, surgical procedures,⁵¹ and alterations to medication orders)⁴⁶ in 18.7% (of 534),⁵⁴ 41.4% (of

367),⁴⁶ and 47% (of 57)⁵¹ of cases. Consumer-initiated calls were also reported to have improved care quality,²⁴ and assisted in identifying safety issues.⁴⁶

Only eight studies provided information upon both the number of CEs and clinician Rapid Response Team (RRT) activations (Table 3).

| Paper | Study duration | Total number of CE referrals | Total number of activations (consumer and clinician) | % referrals initiated by patients/family |
|-------------------------------|----------------|------------------------------|--|--|
| Bavare et al. ⁴⁴ | 3 years | 49 | 1906 | 2.6% |
| Brady et al. ⁴⁵ | 6 years | 83 | 2814 | 2.9% |
| Gerdik et al. ⁴⁰ | 2 years | 25 | Avg. 193/month | 0.5% |
| Gill et al. ²⁶ | 6 months | 0 | 62 | 0% ^a |
| Gill et al. ⁴⁸ | 6 months | 1 | 174 | 0.6% ^c |
| Eden et al. ⁴⁶ | 3.5 years | 367 | 2667 ^b | 13.8% |
| Hueckel et al. ⁴⁹ | 3 months | 2 | 47 | 4.3% |
| McCawley et al. ⁴⁷ | 6 months | 8 | 107 | 7.5% |
| Odell ⁵⁴ | 7 years | 534 | 70,041 | 0.8% |

^aNo calls directly activated through hospital's CE system; however, family concern was reported as the reason for 5 clinician-activated RRT calls

^bFigure based upon approximate number of traditional RRT activations reported by authors + 367 consumer-initiated calls

^cPercentage based upon one call directly activated by family. However, the authors also reported that 8 clinician calls were the direct result of family members requesting a RRS activation

Table 3. CEs as a percentage of all care escalations.

The variation in CEs may, in part, reflect contextual differences⁴⁵ in study settings and duration,²⁵ calling criteria,^{15,16} effectiveness of implementation,^{15,53} consumer awareness,^{15,53} and system maturity.⁵⁴ Whilst there is general agreement that, to date, the volume of consumer-initiated calls is relatively low and therefore, unlikely to overburden RRS resources,^{25,45} the numbers may actually reflect barriers to system usage.²⁶ Consequently, a precise figure reflecting an appropriate volume of CEs remains unknown.⁴⁵ A dose-response, with respect to effectiveness, has been demonstrated for traditional RRS where a higher “dose” (for example, calls per 1,000 hospital admissions) is associated with a reduction in cardiac arrest rates.^{67,68} Thus, a similar consideration may be of importance when assessing the effectiveness of CE. Of the isolated studies that have reported reductions in cardiac arrest^{47,50} or mortality rates⁴⁰ following the introduction of CE, findings must be interpreted with caution, as they are based upon observational studies, whose descriptive nature limits the ability to prove associations with clinical outcomes.⁴⁰ The concurrent introduction of other

safety initiatives,⁴⁰ and figures based upon data for both consumer and clinician RRS activations, the latter of which increased significantly during study periods,^{40,47,50} also restrict the ability to isolate the effects of CE upon patient outcomes.

Five studies reported an increase in the number of clinician RRS activations following the introduction of CE processes.^{39,40,47,49,50} This observation may be explained by clinical staff feeling more inclined and confident to use RRS when supported by consumers,^{23,50} thereby overcoming socio-cultural factors that have previously hindered RRS use and/or effectiveness.^{23,55} By increasing the attention on patient safety, staff accountability, partnership in care, and reducing system and communication barriers, CE processes may additionally promote positive, organisation-wide, cultural changes.^{47,52}

Finally, positive patient and family perceptions towards CE systems were repeatedly reported.^{16,24,25,44,46,51,53,55,57}

System design

Models of CE currently exist;¹⁶ however, limited reported details and contextual variations create difficulties in making comparisons about effectiveness and outcomes. Although specific designs have been proposed,^{52,58} there remains no consensus of what constitutes the most effective system.²⁵ Whilst the required features will, in part, depend upon local context and resource availability,^{17,58} based upon the reviewed evidence, and recommendations associated with traditional medically driven RRS, it is possible to identify (and model) system features that are reported or supported within the literature, and those for which uncertainty remains (Table 4 and Fig. 4).

| Strength | Escalation System Consideration |
|---------------------------------|---|
| Supported within the literature | <ul style="list-style-type: none"> • CE systems do not replace traditional RRS (all studies included CE in addition to clinician-activated RRS). • CE processes provide a pathway for consumers to access an independent clinical review in situations of ongoing concern.^{25,26,45,51-54} Consumers should still be encouraged to raise concerns with their primary health care team in the first instance.^{26,45,53,56} |

| | |
|--|--|
| | <ul style="list-style-type: none"> • Organisational governance and support from executive and clinical leadership are important to successful system implementation^{5,6,26,40,47,48,52} and sustainability.⁵ • Multifaceted and systematic implementation processes,^{16,26,48} including formal consumer and staff education, are recommended to reduce barriers to effective system usage.^{16,23,26,40,45,47,48-50,52,58} • Feedback, evaluation, and quality improvement mechanisms are necessary to improve system effectiveness.¹⁷ This includes evaluation of implementation strategies,^{26,48} staff^{48,51} and consumer feedback,^{15,17,23,40,44,48,49,51,52} auditing,^{17,39,48,52,53} and providing information to staff about system outcomes.^{39,48,50} |
| Potential recommendations for consideration | <ul style="list-style-type: none"> • Consideration may be required for alternative strategies to promote communication between consumers and clinicians,^{20,21,37,58} as a proportion of consumers may not feel sufficiently confident or comfortable to use escalation systems.^{15,20,21,26,48,57,58} • In regards to system activation criteria, collated data indicate a lower rate of CEs in systems focused upon actual clinical deterioration, in comparison to escalation for general consumer concern.¹⁶ Systems focused upon clinical deterioration may, therefore, be more resource effective.^{25,46} Alternative pathways may be necessary to manage other non-life-threatening consumer safety and quality related concerns.^{25,45} |
| Areas of uncertainty requiring further investigation | <ul style="list-style-type: none"> • The optimal consumer activation pathway remains undetermined. Current models include: <ul style="list-style-type: none"> - Indirect pathways: consumer escalates concern to primary care team (using incremental escalation)^{26,48,51} or to a dedicated consumer escalation team/representative who assesses the situation and may activate a RRT if deemed clinically necessary.^{46,47,51,52,53,55} - Direct pathways: consumer able to bypass clinician to directly activate RRT.^{24,26,40,44,45,48-50,54} • The optimal response mechanism, including nature of response team, is potentially dependent upon the indication for activation¹⁶ and local resources.⁵⁸ Current models include: <ul style="list-style-type: none"> - Standard RRT (including the same members who respond to clinician RRS activations).^{24,26,40,44,45,48,49,50,54} |

| | |
|--|---|
| | <ul style="list-style-type: none"> - Dedicated CE team. ^{46,47,51,52,53,55} Varying compositions are reported across the literature. May include clinical and administrative staff.⁵⁸ - An independent assessor.⁵¹ |
|--|---|

Table 4. CE system considerations

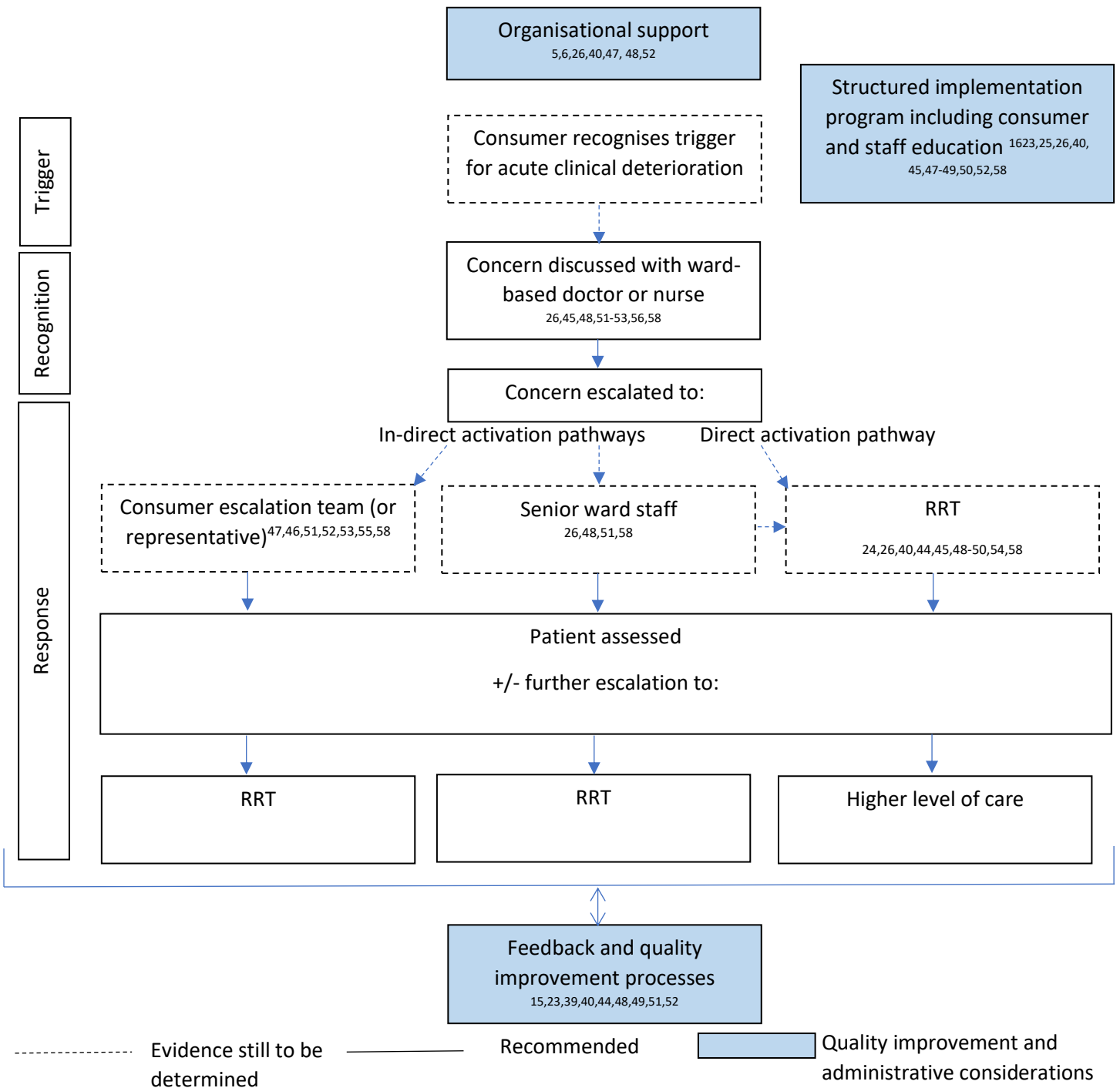


Fig 4. Emerging CE model

IMPLICATIONS FOR PRACTICE AND FUTURE RESEARCH

The concept of CE is not dissimilar from other time critical situations including acute coronary syndrome,⁶⁹ stroke,⁷⁰ and sepsis,⁷¹ whereby public health campaigns are reliant, in part, upon consumers, in the community, recognising and responding to at risk symptoms and signs. However, even within those circumstances there is evidence to indicate that consumers have limited symptom recognition, unawareness regarding the severity of one's illness,^{69,72,73} and a general deficiency in knowledge about the importance of obtaining urgent medical review⁷² resulting in delays in seeking medical support.^{69,72,73} Consequently, educational and awareness programs emphasising the importance of both symptom recognition and the need to seek prompt assistance have been emphasised.⁷² Such findings are arguably of significance when considering hospital-based consumer escalation processes.

Recommendations emerging from the reviewed literature surrounding CE include:

- The importance of formal consumer and staff education to overcoming barriers to system implementation;^{23,49,58}
- Promoting a shared definition, between consumers and clinicians, of what constitutes clinical concern;⁵¹ and
- Rather than expecting consumers to independently voice concerns, alternative approaches may be required to encourage consumer engagement.^{20,21,37}

Further research is required across multiple areas including:

- How consumers define clinical deterioration, and their ability to recognise and report its occurrence;
- The impact of individual consumer characteristics upon patient/family willingness, confidence, and ability to use escalation systems;
- Potential differences in the functioning of CE between adult and paediatric populations;
- How to meet the needs of diverse patient groups;
- The most effective CE model; and
- The optimal method of assessing outcomes including the potential of a dose-response relationship.

Consistent reporting may also allow for meta-analysis of data and greater confidence in findings.

STRENGTHS AND LIMITATIONS

Most studies associated with CE in acute care hospitals fall within the lower levels (or outside) of the evidence hierarchy. Thus, the decision was made to complete a literature review, rather than a systematic review, as the more rigorous study inclusion and exclusion criteria associated with the latter would risk providing only an incomplete view of the available evidence.⁷⁴ The methodology of a literature review instead permitted for the inclusion of all identified peer-reviewed material and study designs and therefore, a more extensive awareness of the breadth of current knowledge,⁷⁵ and the identification of key priorities for further investigation, to be developed. This wider examination of literature is reflected in the inclusion of a greater number of peer-reviewed articles within this paper in comparison to previous systematic reviews.^{16,25}

Justification for completing a literature review was also based on the outcomes of prior systematic reviews highlighting that, owing to limitations in the quality, design and reporting of studies, previous research of CE has not been conducive to answering questions about system effectiveness,²⁵ or impact.¹⁶ Although additional studies have emerged since this time, they were not considered sufficient to justify repeating a systematic review of effectiveness within the acute hospital environment.

CONCLUSIONS

CE has been proposed as a way of increasing patient safety and promoting partnership in care. However, the ability of CE processes to achieve their underlying goals is still to be adequately assessed.

Substantial gaps exist within the current literature, particularly surrounding whether consumers have the ability to timely recognise acute clinical deterioration and are sufficiently confident, and able to escalate their concerns. A low awareness of CE processes, limitations to consumer confidence, and negative staff attitudes may also be acting as barriers to system usage with this reflected in the generally low occurrence rate of consumer escalations to date. Furthermore, current research has largely overlooked the potential impact of individual consumer related factors upon the utility and functioning of CE systems amongst diverse patient groups.

Ultimately, further research is required to fill deficits in the current evidence base to inform, both clinicians and consumers, on how to best implement, support and optimise CE processes.

CONFLICT OF INTEREST

None

ACKNOWLEDGEMENTS AND FUNDING SOURCES

Corresponding author: I acknowledge the support I have received for my research through the provision of an Australian Government Research Training Program Scholarship.

REFERENCES

1. Jones D, Mitchell I, Hillman K, Story D. Defining clinical deterioration. *Resuscitation* 2013;84:1029-34.
2. Padilla RM, Mayo AM. Clinical deterioration: A concept analysis. *J Clin Nurs* 2018;27:1360-8.
3. Zografakis-Sfakianakis M, De Bree E, Linardakis M, et al. The value of the Modified Early Warning Score for unplanned Intensive Care Unit admissions of patients treated in hospital general wards. *Int J Nurs Pract* 2018;24:e12632. (Accessed 27 August 2019 at <https://onlinelibrary.wiley.com/doi/abs/10.1111/ijn.12632>).
4. Department of Health and Human Services. Recognising and responding to clinical deterioration. Standard 9: recognising and responding to clinical deterioration in acute health care. Melbourne, Sector Performance, Quality and Rural Health, Victorian Government, Department of Health (Aus), 2014. (Accessed 11 April 2019 at <https://www2.health.vic.gov.au/about/publications/policiesandguidelines/nsqhs-online-learning-st9-clinical-deterioration>).
5. Australian Commission on Safety and Quality in Health Care. National consensus statement: essential elements for recognising and responding to acute physiological deterioration 2nd ed. Sydney, ACSQHC (Aus), 2017. (Accessed 27 August 2019, at <https://www.safetyandquality.gov.au/publications-and-resources/resource-library/national-consensus-statement-essential-elements-recognising-and-responding-acute-physiological-deterioration-second-edition>).

6. College of Intensive Care Medicine of Australia and New Zealand. Joint position statement on rapid response systems in Australia and New Zealand and the roles of intensive care. Prahran, College of Intensive Care Medicine of Australia and New Zealand & Australian and New Zealand Intensive Care Society (Aus), 2016. (Accessed 15 May 2019, at <https://www.cicm.org.au/Resources/Professional-Documents#Statements>).
7. Hillman KM, Chen J, Jones D. Rapid response systems. *Med J Aust* 2014;201:519-21.
8. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. 2nd ed. Sydney, ACSQHC (Aus), 2017. (Accessed 23 September 2019, at <https://www.safetyandquality.gov.au/sites/default/files/migrated/National-Safety-and-Quality-Health-Service-Standards-second-edition.pdf>).
9. Boniatti MM, Azzolini N, Viana MV, et al. Delayed medical emergency team calls and associated outcomes. *Crit Care Med* 2014;42:26-30.
10. Odell M. Detection and management of the deteriorating ward patient: an evaluation of nursing practice. *J Clin Nurs* 2015;24:173-82.
11. Shearer B, Marshall S, Buist MD, et al. What stops hospital clinical staff from following protocols? An analysis of the incidence and factors behind the failure of bedside clinical staff to activate the rapid response system in a multi-campus Australian metropolitan healthcare service. *BMJ Qual Saf* 2012;21:569-75.
12. Trinkle RM, Flabouris A. Documenting Rapid Response System afferent limb failure and associated patient outcomes. *Resuscitation* 2011;82:810-4.
13. Padilla RM, Mayo AM. Patient survival and length of stay associated with delayed rapid response system activation. *Crit Care Nurs Q* 2019;42:235-45.
14. Barbosa V, Gomes E, Vaz S, et al. Failure to activate the in-hospital emergency team: causes and outcomes. *Rev Bras Ter Intensiva* 2016;28:420-6.
15. Gill FJ, Leslie G, Marshall AP. Family initiated escalation of care for the deteriorating patient in hospital: Family centred care or just "box ticking". *Aust Crit Care* 2016;29:195-200.
16. Gill F, Leslie G, Marshall A. The Impact of implementation of family-initiated escalation of care for the deteriorating patient in hospital: a systematic review. *Worldviews Evid Based Nurs* 2016;13:303-13.
17. Australian Commission on Safety and Quality in Health Care. Essential element 2: escalation of care. Sydney, ACSQHC (Aus), 2012. (Accessed 7 February 2020, at <https://www.safetyandquality.gov.au/sites/default/files/migrated/Low-res-PDF-Essential-element-2-escalation-of-care.pdf>).

18. State of Queensland. Ryan's Rule. Queensland Health (Aus), 2017. (Accessed 26 May 2019, at <https://clinicaexcellence.qld.gov.au/sites/default/files/docs/ryans-rule/ryans-rule-brochure.pdf>).
19. State of South Australia. Findings of inquest: Stephen Robert Atkins, Inquest Number 02/2018 (0486/2015). Courts Administration Authority of South Australia (Aus), 2018. (Accessed 4 September 2019, at <http://www.courts.sa.gov.au/CoronersFindings/Lists/Coroners%20Findings/Attachments/775/ATKINS%20Stephen%20Robert.pdf>).
20. Guinane J, Hutchinson AM, Bucknall TK. Patient perceptions of deterioration and patient and family activated escalation systems - a qualitative study. *J Clin Nurs* 2018;27:1621-31.
21. Rainey H, Ehrich K, Mackintosh N, Sandall J. The role of patients and their relatives in 'speaking up' about their own safety - a qualitative study of acute illness. *Health Expect* 2015;18:392-405.
22. DeVita MA, Smith GB, Adam SK, et al. "Identifying the hospitalised patient in crisis"- a consensus conference on the afferent limb of rapid response systems. *Resuscitation* 2010;81:375-82.
23. Vorwerk J, King L. Consumer participation in early detection of the deteriorating patient and call activation to rapid response systems: a literature review. *J Clin Nurs* 2016;25:38-52.
24. Odell M, Gerber K, Gager M. Call 4 concern: patient and relative activated critical care outreach. *Br J Nurs* 2010;19:1390-5.
25. Albutt AK, O'Hara JK, Conner MT, Fletcher SJ, Lawton RJ. Is there a role for patients and their relatives in escalating clinical deterioration in hospital? A systematic review. *Health Expect* 2017;20:818-25.
26. Gill FJ, Leslie GD, Marshall AP. Barriers and facilitators to implementing a process to enable parent escalation of care for the deteriorating child in hospital. *Health Expect* 2018;21:1095-103.
27. Institute for Healthcare Improvement. Delivering great care: engaging patients and families as partners. Boston, Institute for Healthcare Improvement (USA), 2019. (Accessed 1 September 2019, at <http://www.ihl.org/resources/Pages/ImprovementStories/DeliveringGreatCareEngagingPatientsandFamiliesasPartners.aspx>).
28. NHS Improvement. The adult patient who is deteriorating: sharing learning from literature, incident reports and root cause analysis investigations. London, NHS Improvement (UK), 2016. (Accessed 1 September 2019, at https://improvement.nhs.uk/documents/176/Deterioration_in_adults_report_7july.pdf).

29. Australian Commission on Safety and Quality in Health Care. Action 8.7: escalating care. Sydney, ACSQHC (Aus), 2019. (Accessed 12 August 2019, at <https://www.safetyandquality.gov.au/standards/nsqhs-standards/recognising-and-responding-acute-deterioration-standard/detecting-and-recognising-acute-deterioration-and-escalating-care/action-87>).
30. Ecker E, Skelly A. Conducting a winning literature search. *Evid Based Spine Care J* 2010;1:9-14.
31. Horsley T, Dingwall O, Tetzlaff J, Sampson M. Checking reference lists to find additional studies for systematic reviews. *Cochrane Database Syst Rev* 2009;MR000026. (Accessed 26 May 2019, at <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.MR000026/epdf/full>).
32. Greenhouse P, Kuzminsky B, Martin S, Merryman T. Calling a condition H(elp). *Am J Nurs* 2006;106:63-6.
33. Dean B, Decker M, Hupp D, Urbach A, Lewis E, Benes-Stickle J. Condition Help: a pediatric rapid response team triggered by patients and parents. *J Healthc Qual* 2008;30:28-31.
34. The University of Adelaide. Adelaide Nursing School style and referencing guide 2017. Adelaide, The University of Adelaide (Aus), 2017. (Accessed 16 March 2019, at https://libguides.adelaide.edu.au/ld.php?content_id=47107822).
35. Mackintosh N, Davis R, Easter A, et al. Interventions to increase patient and family involvement in escalation of care for acute life-threatening illness in community health and hospital settings. *Cochrane Database Syst Rev* 2017;CD012829. (Accessed 19 August 2019, at <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD012829/full>).
36. McKinney A, Fitzsimons D, Blackwood B, McGaughey J. Patient and family-initiated escalation of care: a qualitative systematic review protocol. *Syst Rev* 2019;8:91. (Accessed 5 September 2019, at <https://systematicreviewsjournal.biomedcentral.com/articles/10.1186/s13643-019-1010-z>).
37. Albutt A, O'Hara J, Conner M, Lawton R. Involving patients in recognising clinical deterioration in hospital using the Patient Wellness Questionnaire: a mixed-methods study. *J Res Nurs* 2020;25:68-86.
38. Zix, J, Giaccone, M, Wheeler, D, Dressman, K, Muething, S, Tegtmeyer, K. 892: Family activated rapid response team: what we know five years later. *Crit Care Med* 2012;40:1-328.
39. Van Voorhis KT, Willis TS. Implementing a pediatric rapid response system to improve quality and patient safety. *Pediatr Clin North Am*. 2009;56:919-33.

40. Gerdik C, Vallish RO, Miles K, Godwin SA, Wludyka PS, Panni MK. Successful implementation of a family and patient activated rapid response team in an adult level 1 trauma center. *Resuscitation* 2010;81:1676-81.
41. The Joanna Briggs Institute Levels of Evidence and Grades of Recommendation Working Party*. Supporting document for the Joanna Briggs Institute Levels of Evidence and Grades of Recommendation. The Joanna Briggs Institute, 2014. (Accessed 1 September 2019, at <https://joannabriggs.org/sites/default/files/2019-05/JBI%20Levels%20of%20Evidence%20Supporting%20Documents-v2.pdf>).
42. The Joanna Briggs Institute Levels of Evidence and Grades of Recommendation Working Party. JBI levels of evidence. The Joanna Briggs Institute, 2013. (Accessed 1 September 2019, at https://joannabriggs.org/sites/default/files/2019-05/JBI-Levels-of-evidence_2014_0.pdf).
43. See A, Chan W, Huggan P, Tay Y, Liaw S. Effectiveness of a patient education intervention in enhancing the self-efficacy of hospitalized patients to recognize and report acute deteriorating conditions. *Patient Educ Couns* 2014;97:122-7.
44. Bavare AC, Thomas JK, Elliott EP, Morgan AC, Graf JM. Family-initiated pediatric rapid response: characteristics, impetus, and outcomes. *J Healthc Qual* 2018;40:103-9.
45. Brady P, Zix J, Brilli R, et al. Developing and evaluating the success of a family activated medical emergency team: a quality improvement report. *BMJ Qual Saf* 2015;24:203-11.
46. Eden EL, Rack LL, Chen LW, Bump GM. Condition Help: a patient- and family-initiated rapid response system. *J Hosp Med* 2017;12:157-61.
47. McCawley B, Gannotta R, Champagne M, Wood K. Calling a "Condition H". *Nurs Manag* 2013;44:30-5.
48. Gill FJ, Leslie GD, Marshall AP. Parent escalation of care for the deteriorating child in hospital: a health-care improvement study. *Health Expect* 2019.;22:1078-88.
49. Hueckel RM, Mericle JM, Frush K, Martin PL, Champagne MT. Implementation of condition help: family teaching and evaluation of family understanding. *J Nurs Care Qual* 2012;27:176-81.
50. Ray E, Smith R, Massie S, et al. Family alert: implementing direct family activation of a pediatric rapid response team. *Jt Comm J Qual Patient Saf* 2009;35:575-80.
51. Dwyer TA, Flenady T, Kahl J, Quinney L. Evaluation of a patient and family activated escalation system: Ryan's Rule. *Aust Crit Care* 2020;33:39-46.
52. Bogert S, Ferrell C, Rutledge D. Experience with family activation of rapid response teams. *Medsurg Nurs* 2010;19:215-23.

53. Baird SK, Turbin LB. Condition concern: an innovative response system for enhancing hospitalized patient care and safety. *J Nurs Care Qual* 2011;26:199-207.
54. Odell M. Patient- and relative-activated critical care outreach: a 7-year service review. *Br J Nurs*. 2019;28:116-21.
55. Dunning E, Brzozowicz K, Noel E, et al. Fast track beyond RRTs. *Nurs Manag* 2010;45:38-41.
56. Paciotti B, Roberts K, Tibbetts K, et al. Physician attitudes towards family-activated medical emergency teams for hospitalized children. *Jt Comm J Qual Patient Saf* 2014;40:187-92.
57. Strickland W, Pirret A, Takerei S. Patient and/or family activated rapid response service: patients' perceptions of deterioration and need for a service. *Intensive Crit Care Nurs* 2019;51:20-6.
58. King L, Peacock G, Crotty M, Clark R. Consumers' perspectives on their involvement in recognizing and responding to patient deterioration - developing a model for consumer reporting. *Health Expect* 2019;22:385-95.
59. Queensland Government. Ryan's Rule. The State of Queensland, Queensland Health (Aus), 2019. (Accessed 28 December 2019, at <https://clinicalexcellence.qld.gov.au/priority-areas/safety-and-quality/ryans-rule>).
60. Alizadeh S, Chavan M. Cultural competence dimensions and outcomes: a systematic review of the literature. *Health Soc Care Community* 2016;24:e117-30.
61. Moreria L. OECD health working paper no. 107. Health literacy for people centred care. Where do OECD countries stand?. Organisation for Economic Co-operation and Development, 2018. (Accessed 16 September 2019, at [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DELSA/HEA/WD/HWP\(2018\)4&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DELSA/HEA/WD/HWP(2018)4&docLanguage=En)).
62. Malik M, Zaidi RZ, Hussain A. Health literacy as a global public health concern: a systematic review. *J Pharm Clin Res* 2017;4. (Accessed 12 September 2019, at <https://pdfs.semanticscholar.org/f18c/2105fa4065e4b76024023946430f6334f35f.pdf>).
63. Australian Commission on Safety and Quality in Health Care. Consumers, the health system and health literacy: taking action to improve safety and quality. Consultation Paper. Sydney, ACSQHC (Aus), 2013. (Accessed 27 May 2018, at <https://www.safetyandquality.gov.au/wp-content/uploads/2012/01/Consumers-the-health-system-and-health-literacy-Taking-action-to-improve-safety-and-quality3.pdf>).
64. Australian Commission on Safety and Quality in Health Care. Health literacy: taking action to improve safety and quality. Sydney, ACSQHC (Aus), 2014. (Accessed 22 September 2019, at

<https://www.safetyandquality.gov.au/sites/default/files/migrated/Health-Literacy-Taking-action-to-improve-safety-and-quality.pdf>).

65. Wolf, M, Bailey, S. The Role of Health Literacy in Patient Safety. Rockville, Patient Safety Network, Agency for Healthcare Research and Quality, US Department for Health and Human Services (USA), 2009. (Accessed 21 September 2019, at <https://psnet.ahrq.gov/perspective/role-health-literacy-patient-safety>).
66. Australian Commission on Safety and Quality in Health Care. Standard 2: partnering with consumers. Tip sheet 8: health literacy and the NSQHS standards. Sydney, ACSQHC (Aus), 2015. (Accessed 30 January 2020, at <https://www.safetyandquality.gov.au/sites/default/files/migrated/Standard-2-Tip-Sheet-8-Health-literacy-and-the-NSQHS-Standards.pdf>).
67. Jones D, Bellomo R, DeVita MA. Effectiveness of the Medical Emergency Team: the importance of dose. *Crit Care* 2009;13:313. (Accessed 30 August 2019, at <https://ccforum.biomedcentral.com/track/pdf/10.1186/cc7996>).
68. Jones D, Rubulotta F, Welch J. Rapid response teams improve outcomes: yes. *Intensive Care Med* 2016;42:593-5.
69. Farquharson B, Abhyankar P, Smith K, et al. Reducing delay in patients with acute coronary syndrome and other time-critical conditions: a systematic review to identify the behaviour change techniques associated with effective interventions. *Open Heart* 2019;6:e000975. (Accessed 15 August 2019, at <https://openheart.bmj.com/content/openhrt/6/1/e000975.full.pdf>).
70. Lecouturier J, Rodgers H, Murtagh M, White M, Ford G, Thomson R. Systematic review of mass media interventions designed to improve public recognition of stroke symptoms, emergency response and early treatment. *BMC Public Health* 2010; 10:784. (Accessed 11 January 2010, at <https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-10-784>).
71. Kempker JA, Wang HE, Martin GS. Sepsis is a preventable public health problem. *Crit Care*. 2018;22:116. (Accessed 11 January 2020, at <https://ccforum.biomedcentral.com/track/pdf/10.1186/s13054-018-2048-3>).
72. Dolmans LS, Hoes AW, Bartelink MEL, Koenen NCT, Kappelle LJ, Rutten FH. Patient delay in TIA: a systematic review. *J Neurol* 2019;266:1051-8.
73. Mol KA, Rahel BM, Meeder JG, van Casteren BC, Doevendans PA, Cramer MJ. Delays in the treatment of patients with acute coronary syndrome: focus on pre-hospital delays and non-ST-elevated myocardial infarction. *Int J Cardiol* 2016;221:1061-6.
74. Crequit P, Trinquart L, Yavchitz A, Ravaud P. Wasted research when systematic reviews fail to provide a complete and up-to-date evidence synthesis: the example of

lung cancer. BMC Med 2016;14:59. (Accessed 21 June 2020, at <https://bmcmmedicine.biomedcentral.com/articles/10.1186/s12916-016-0555-0>).

75. Grant M, Booth A. A typology of reviews: an analysis of 14 review types and associated methodologies. Health Info Libr J. 2009; 26:91-108.