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SPECIAL ISSUE ARTICLE

Factors that influence hospital nurses' escalation of patient care in response to their early warning score: A qualitative evidence synthesis

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Abstract

Background: The Early Warning Score (EWS) is a validated tool that has improved patient outcomes internationally. This scoring system is used within the hospital setting to identify potentially deteriorating patients, thus expediting referral to appropriate medical personnel. It is increasingly recognised that there are other influencing factors along with EWS, which impact on nurses' decisions to escalate care.

Aim: The aim of this review was to identify and synthesise data from qualitative studies, which examined factors influencing nurses' escalation of care in response to patients' EWS.

Methods: The systematic search strategy and eligibility criteria were guided by the SPIDER (Sample Phenomenon of Interest Design Evaluation Type of Research) framework. Eleven databases and five grey literature databases were searched. Titles and abstracts were independently screened in line with pre-established inclusion and exclusion criteria using the cloud-based platform, Rayyan. The selected studies underwent quality appraisal using CASP (Critical Appraisal Skills Programme, 2017, https://www.casp-uk.net/casp-toolschecklists) and subsequently synthesised using Thomas and Harden's thematic analysis approach. GRADE–CERQual (Grading of Recommendations Assessment Development and Evaluation–Confidence in the Evidence from Reviews of Qualitative research) was used to assess confidence in results. The EQUATOR listed guideline ENTREQ (Tong et al., 2012, BMC Medical Research Methodology, 12) was used to synthesise and report findings.

Abbreviations: (I)SBAR, Identify, Situation, Background, Assessment, Recommendation; ANP, Advanced Nurse Practitioner; CASP, Critical Appraisal Skills Programme; COPD, Chronic Obstructive Pulmonary Disease; DOH, Department of Health; ENTREQ, Enhancing transparency in reporting the synthesis of qualitative research; EQUATOR, Enhancing the QUAlity and Transparency Of health Research; EWS, Early Warning Score; GRADE–CERQual, Grading of Recommendations Assessment Development and Evaluation–Confidence in the Evidence form Reviews of Qualitative Research; INEWS, Irish National Early Warning Score; INEWSv2, Irish National Early Warning System Version 2; MEWS, Modified Early Warning Score; NCEC, National Clinical Effectiveness Committee; NCG, National Clinical Guideline; NEWS, National Early Warning Score; NICE, National Institute for Health and Care Excellence; ORC, Observation & Response Chart; PICO, Population, Intervention, Comparison, Outcome; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; QES, Qualitative Evidence Synthesis; QESs, Qualitative Evidence Syntheses; RCOP, Royal College of Physicians; RETREAT, Review question/Epistemology/Time/Resources/Expertise/Audience and Purpose/Type of Data; RGN, Registered General Nurse; SAEs, Serious Adverse Events; SMART, Specific/Measurable/Achievable/Realistic/Timely; SPIDER, Sample, Phenomenon of Interest, Design, Evaluation, Research Type; T&T, Track and Trigger; ViEWS, Vital Pac Early Warning Score; WHO, World Health Organisation.

Results: Eighteen studies from seven countries including 235 nurses were identified. Following synthesis, four analytical themes were generated with eighteen derived consequent findings. The four themes identified were as follows:

1) *Marrying nurses' clinical judgement with EWS 2) SMART communication 3) EWS Protocol*: *Blessing and a Curse* 5) *Hospital Domain*.

Conclusion: Nurses strive to find *balance* by simultaneously navigating within the boundaries of both the EWS protocol and the hospital domain. They view the EWS as a valid essential component in the system but one that does not give a definitive answer and absolute direction. They value the protocols' ability to identify deteriorating patients and convey the seriousness of a situation to their multidisciplinary colleagues but also find it somewhat restrictive and frustrating and wish to have credence given to their own intuition and clinical judgement.

KEYWORDS
clinical deterioration, early warning system, escalation of care, nurse, qualitative research

1 | INTRODUCTION

To prevent serious adverse events (SAEs), hospitals require tools that help them recognise patients at risk and guide them in giving the right care at the right time (Alam et al., 2014). SAEs such as sepsis, cardiac arrest and even death are frequently preceded by physiological abnormalities (Alam et al., 2014; Connolly et al., 2017). Early Warning Score (EWS) tools are observation charts that have been designed to enable users to gradually and consistently track and chart patient's vital signs (Elliott et al., 2015). It uses a numerical scoring system, which signals physiological changes that detect patients in danger of deterioration.

The EWS is used predominately by nurses for documenting vital signs and escalating care in response to patient acuity (Flenady et al., 2020). The National Institute for Health and Care Excellence (Centre for Clinical Practice at NICE [UK] 2007) guidelines recommend the use of vital sign parameters to calculate an overall score which categorises patient's acuity level and subsequently triggers nursing staff to request a medical evaluation (Mitchell et al., 2010). A National Early Warning Score (NEWS) system was introduced in Ireland in 2013 and was updated in September 2020 as INEWSv2 (Irish National Early Warning System, version 2) (Department of Health, 2020) (Figure 1). Modifications of EWS are used internationally; however, they all have the same purpose to ensure prompt detection of the unwell patient and activate a response (Foley & Dowling, 2019; Jensen et al., 2019). EWS use can be seen throughout health services in the United Kingdom, Europe, Australia and America (Gerry et al., 2020).

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

1. Supports the use of the Early Warning Score as a system rather than a score and recognises that nurses strive to strike a *balance* between adherence to EWS protocols, using their own clinical judgement and manage the communication complexities present within hospital domains.
2. Highlights the multifactorial nature of processes used by nurses when deciding whether to escalate care based on patients EWS score and suggests consideration of information garnered from other sources
3. Underscores nurses' perceptions that the Early Warning Score facilitates multidisciplinary SMART communication and optimally results in expedited care and positive patient outcomes but can have its flaws depending on its use and if used in isolation.
4. Nurses lack of commentary on the (I) SBAR communication tool raises the question of its perceived relevance and utilisation, especially given the complexity of clinical decision making related to acuity and deterioration. Comparison of communication systems in differing healthcare systems is required to provide insight into optimal ways in which to communicate patient deterioration and escalation

1.1 | Problem Identification

Nurses are the largest professional group in any acute setting and as such have a strong role to play in the surveillance and interpretation of patients' vital signs (Dalton et al., 2018; Jensen et al., 2019). This is recognised in the INEWSv2 which in response to a systematic review by the Health Research Board Collaboration for Clinical Effectiveness Reviews (2018) included the proviso that a registered nurse may use his/her own clinical judgement and defer escalation of care (max.

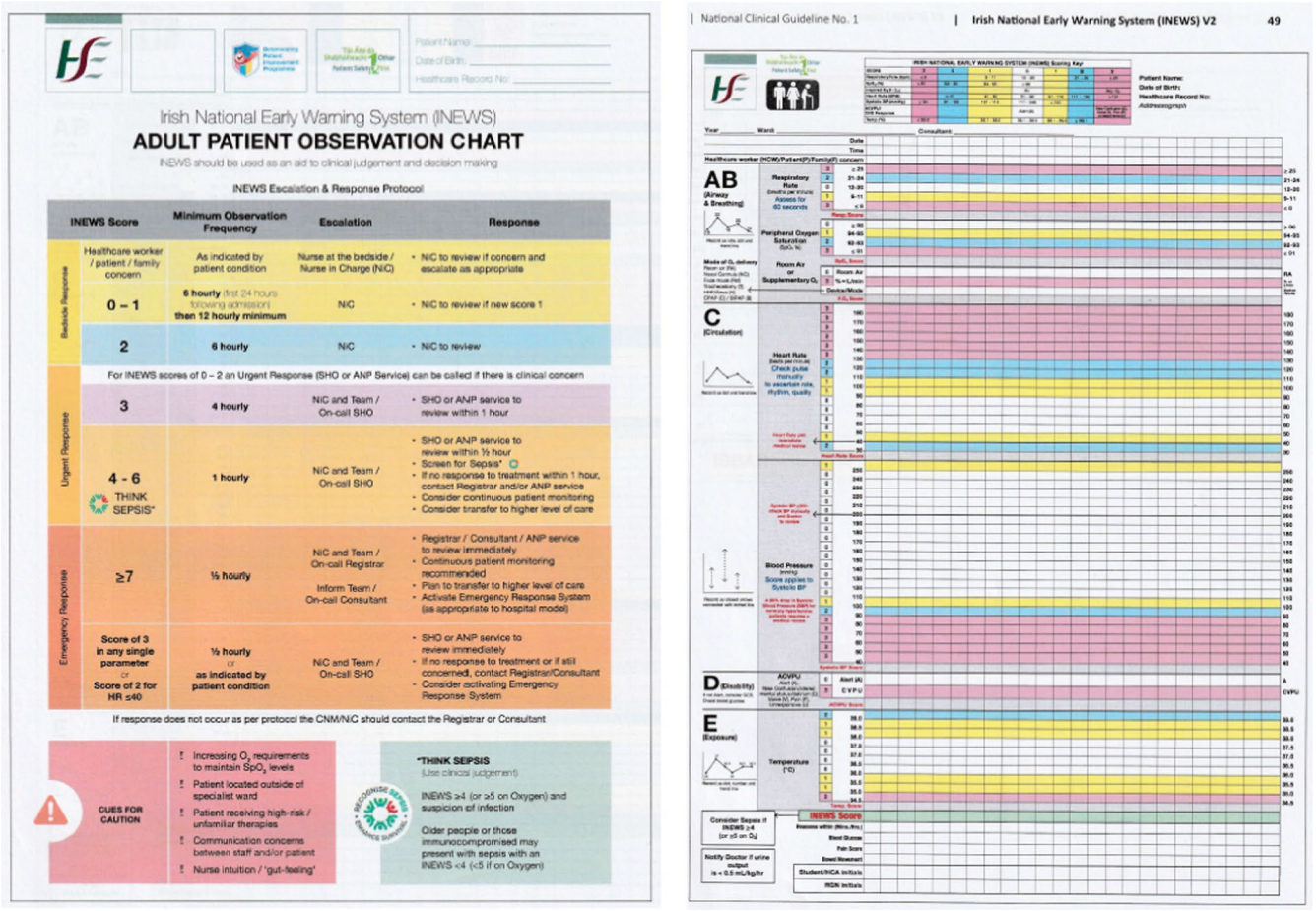


FIGURE 1 INEWS Chart (Department of Health 2020)

30 min) in response to patients EWS (Department of Health, 2020). This amendment to the national clinical guidelines prompted the principal researcher to conduct an initial scoping exercise. Initial scoping strategies are recommended prior to QES as it allows a researcher to extend their knowledge, familiarise themselves with the topic prior to commencing a comprehensive systematic search and identify all relevant available data (Gusenbauer & Haddaway, 2020a).

The initial search in this instance found studies which confirmed the predictive power and reliability of the EWS and its positive effect on patient outcomes—ICU transfer, cardiac arrest and in hospital mortality (Fu, Li.-Heng et al., 2020). However, others suggested that nurses experienced organisational, clinical and behavioural challenges when identifying and acting on patient deterioration (Massey et al., 2016). Griffiths et al. (2018) revealed 44% of patients in high acuity categories (EWS 6+) were not escalated. Credland et al. (2018) found nurses experienced some frustration with EWS use and its perceived inflexibility with a resultant lack of compliance reflected in issues around inaccurate scoring, chart omissions, incorrectly calculated EWS and non-adherence with monitoring frequency and escalation protocols. Significantly, previous QES did not examine nurses exclusively in the context of their decision making and EWS use, rather they had broader sample inclusion criteria, thus enabling the addition of studies which recruited health care workers (HCW) as part of the study population (Connolly et al., 2017; O'Neill et al., 2021). Moreover, the scoping exercise identified several additional relevant qualitative studies which had not been included in previous reviews (Dalton et al., 2018; Ede et al., 2020; Flenady et al., 2020; Foley & Dowling, 2019; Jensen et al., 2019). These discoveries aided in the development of inclusion and exclusion criteria and provided the rationale for conducting a QES that solely examined nurse's decision making in the context of EWS use.

2 | AIMS AND METHODS

The aim of this review was to identify and synthesise data from primary qualitative studies, which examined the factors influencing nurses' decisions to escalate care in response to patients' EWS.

Booth et al. (2018) seven domain RETREAT framework was used to inform the principal considerations when selecting QES approaches and Thomas and Harden's (2008) thematic synthesis method used for analysis. Thematic synthesis allows for an organised and structured approach to the development of descriptive analytical themes drawn from the primary data (Flemming & Noyes, 2021).

Whilst quantitative evidence can examine empirical evidence such as utilisation, cost and clinical effectiveness, it cannot measure other outcomes such as the choices people make or the factors that influence why people make certain choices (Curry et al., 2009). Qualitative

research delves into people's experiences or their perceptions in a particular setting. In healthcare it strives to explain the phenomena of interest by exploring individual experiences, behaviours and the environment in which social interactions take place (Lockwood et al., 2015). Using the QES process allows a researcher to acquire a better understanding of these experiences, beliefs and perceptions, by combining the results of the individual studies in such a way that adds quality or complexity to the original findings (Flemming et al., 2019).

The research question for the review was as follows: What are the factors that influence nurses to escalate care in response to patients' Early Warning Scores? The findings were synthesised and reported using ENTREQ guidelines (Enhancing Transparency in Reporting the Synthesis of Qualitative Research, Supplementary File 1).

2.1 | Search Strategy

The search strategy began with refining the research question using the SPIDER framework (Sample, Phenomenon of Interest, Design, Evaluation, Research) (Cooke et al., 2012). This allowed for extension of the question formulation and best suited the nature of the question being asked (Flemming & Noyes, 2021). Main headings and search strings were formulated with the assistance of a senior medical librarian as database knowledge of truncation and wildcard operators is essential (Butler et al., 2016) (Table 1). The structure of the SPIDER framework was also adapted to map the inclusion and exclusion criteria in an unambiguous manner (Table 2).

A 3-part comprehensive strategy was employed using databases, hand-searching and grey literature searches (Butler et al., 2016). Eleven databases and five grey literature databases were searched (Appendix 1). The goals of a systematic search are the identification of all available relevant papers, in a transparent and reproducible way (Gusenbauer & Haddaway, 2020a). Booth et al. (2016) and Salah et al. (2014) emphasise the importance of including grey literature as it reduces the risk of publication bias. The database searches were augmented by citation chaining (Dundar & Fleeman, 2017), and the search concluded with a Google Scholar check. Google scholar is recommended as an overall control check (Gusenbauer & Haddaway, 2020b) and is cited as useful in identifying unique references and enhancing overall recall when used in combination with other databases (Bramer et al., 2017). A total of 1,846 studies were imported into Endnote version x9. Removal of duplicates resulted in 821 papers being uploaded into the Rayyan database for eligibility screening (Figure 2).

2.2 | Screening and Study Selection

To ensure transparency, screening was carried out in two stages by two reviewers (Waffenschmidt et al., 2019) using the Rayyan software platform to assist with the screening and selection of studies. The first stage saw [C.B.][1] and [M. O'N.][3] independently review the title and abstract of 821 studies using pre-determined inclusion/exclusion criteria. Full text screening was carried out on 55 studies by [C.B.] and [MO'N.] with resolution of conflicts from [Y.C.][2,] resulting in 18 studies being selected for synthesis (Table 3). Full text screening was employed to ensure articles fully complied with set inclusion criteria. Pre-set inclusion and exclusion criteria were systematically applied to the title and the abstract, thus ensuring the studies fit the criteria and were relevant to the review question (Dundar & Fleeman, 2017).

The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009) were employed and are illustrated in a flow chart (Figure 2).

2.3 | Quality Assessment

Quality appraisal of the eighteen studies using the CASP tool was carried out simultaneously with data extraction (Noyes and Lewin 2011). The WHO and Cochrane endorse CASP for novice researchers when undertaking a QES (Long et al., 2020). The results of the quality assessment were tabulated and presented (Table 4). Studies were not excluded even if their CASP score suggested weaknesses as they can still make a significant contribution to a QES (Boland et al., 2017; Thomas & Harden, 2008). GRADE–CERQual analysis (Lewin et al., 2018) examined confidence in the eighteen review findings (Table 7).

2.4 | Data Extraction and thematic analysis

An adapted version of Houghton et al.'s, (2016) data extraction form (permission given) was used as a blueprint to specify and exhibit each of the studies in terms of context (setting, participants and intervention) as well as study design, methodology, findings and quality of the study (Noyes & Lewin, 2011). This format assisted with both the interpretation and subsequent codifying of the data. All studies were treated in the same way, which paved the way for a more analytical and interpretive data synthesis later. A characteristics table displaying individual study methods, participants, results and CASP score was developed (Table 3).

Thematic analysis was undertaken by CB and YC. Thomas and Harden's (2008) three-step approach was used to synthesise the findings. Firstly, line-by-line coding was performed, secondly, these codes were grouped together which resulted in the development of descriptive themes. Lastly, these themes were further refined and led to the generation of the four analytical themes which answer the research question (Table 5). Quotations reflective of the descriptive themes were tabulated (Table 6).

After data synthesis and analysis, the findings were examined using GRADE–CERQual to determine levels of confidence in the evidence. This results in a judgement of confidence in each finding under four components: methodological limitations, relevance, coherence and adequacy of data (Lewin et al., 2018). The use of GRADE–CERQual assessments is increasingly considered best practice by reviewers (Flemming & Noyes, 2021) (Table 7).

TABLE 1 SPIDER Search strings

SPIDER	S Sample *Registered Nurses*		P -I Phenomenon of Interest *Early Warning score*		D Design *Descriptive Research Incorporating experiences*		E Evaluation *Escalation of care*	R Research *Qualitative Or Mixed Method*
Search:	Keyword:1:		Keyword 2:		Keyword 3:		Keyword 4:	
Note: Column D (Design) & Column R (Research) also combined and searched with Boolean Operator OR before all elements were combined with Boolean AND	Nurse* all fields searched		Early Warning Score MH		'Focus group*' *OR* Interview* *OR* 'Observation' *OR* Phenomen* *OR*		Escalation of care	Qualitative Research MH
Synonyms:		AND	'Early Warning System' *OR* 'warning system' *OR* 'warning score' *OR* 'EWS' *OR* 'physiological monitoring' *OR* 'physiological scoring system' *OR* 'MEWS' *OR* 'Modified Early Warning Score' *OR* 'national early warning score' *OR* 'NEWS' *OR* NEWS2 *OR* 'Track and Trigger system' *OR* 'vital signs' *OR* 'vital sign score'	AND	'Grounded theory' *OR* Ethnograph* *OR* Lifeworld *OR* 'Conversation analysis' *OR* 'Action research' *OR* Hermeneutic *OR* Narrative *OR* 'Content analysis' *OR* Colaizzi* *OR* Heidegger *OR* 'Van Manen' *OR* 'Merleau Ponty' *OR* Husserl *OR* Questionnaire	AND	'escalation of care' *OR* 'Escalate Care' *OR* 'clinical deterioration' *OR* 'deterioration' *OR* 'deteriorating' *OR* 'response team' *OR* 'rapid response' *OR* 'medical emergency team' *OR* 'outreach' *OR* 'critical care outreach' *OR* 'worsening vital signs'	'Qualitative' OR 'Mixed Method' OR 'Mixed Methods'

TABLE 2 Inclusion and Exclusion Criteria using SPIDER Framework

SPIDER		Inclusion Criteria	Exclusion Criteria
S	Sample	Registered Nurses Only studies involving adult patients ≥16 years of age will be included. *Rationale:* *To represent the specific populations under study in the research question.*	Undergraduate / Student Nurses. Enrolled Nurses/ LPN (licensed practical nurse) -work under the guidance of a Registered Nurse they do not interpret clinical data. *Rationale:* *The research question is specific to qualified registered nurses only.* Midwives/ Student midwives. Paediatric Nurses. Critical Care Nurses. Emergency Nurses. *Rationale: Worthy of their own study*
P of I	Phenomenon of Interest	Studies must include the main concepts of the question and the research design: 1. Registered Nurses. 2. Early Warning Score or System, different iterations can be included, that is EWS/MEWS/ Track and Trigger/ Views/NEWS/NEWS2/ORC. 3. Escalation of Care or Clinical deterioration or Rapid Response. *Rationale:* *To answer the research question*	Studies that do not include Registered Nurses and track and trigger systems. Studies outside the acute hospital setting, that is community, long term settings. Studies in critical care areas (intensive care and high dependency). Studies in Accident and Emergency or Psych unit. *Rationale:* *These are different phenomena of interest that are all worthy of their own study.* Exclude Studies: Studies on Paediatric warning scores Studies on Obstetric warning scores *Rationale:* *The scoring systems used in paediatric patient (i.e., aged <16 years) populations are different and/or pregnant patients.*
D	Design	Include: Qualitative studies or Mixed Method Studies where qualitative element is clearly presented. Studies with Focus Groups/ Observations/Case Study/Realist Evaluation/ Semi-structured Interviews/Interviews. The design, methodology and type of analysis must be qualitative and clearly reported (e.g. thematic analysis or grounded theory). *Rationale:* *These designs provide the rich data that is the essence of good qualitative research.*	Exclude: Quantitative Studies or Mixed methods studies without the qualitative element clearly presented. Studies where data is collected qualitatively and then use descriptive analysis (e.g. quantitative analysis). *Rationale:* *There are many quantitative studies on the validity of the EWS system in monitoring deteriorating patients and they have shown positive outcomes.* *There are quantitative studies that identified patterns of compliance with the EWS system, but this review is looking at what factors influence nurses in their escalation of care in response to patients EWS – a qualitative evidence synthesis.*
E	Evaluation	Escalation of Care	
R	Research	Studies must be empirical and provide a description of the sampling approach and data collection processes and type of analysis used.	Literature reviews or Editorials are excluded because they are not primary studies.
	Language	English language	Non-English language
		Be published in a peer-reviewed journal (Grey literature excluded). *Rationale:* *Ensures rigour.*	Studies where full text is unavailable. Every effort will be made to obtain the full text of studies (e.g. unpublished theses). This may be done by interlibrary loans or by contacting the authors directly. Due to time constraints if the text cannot be acquired within 2 weeks it will have to be excluded.

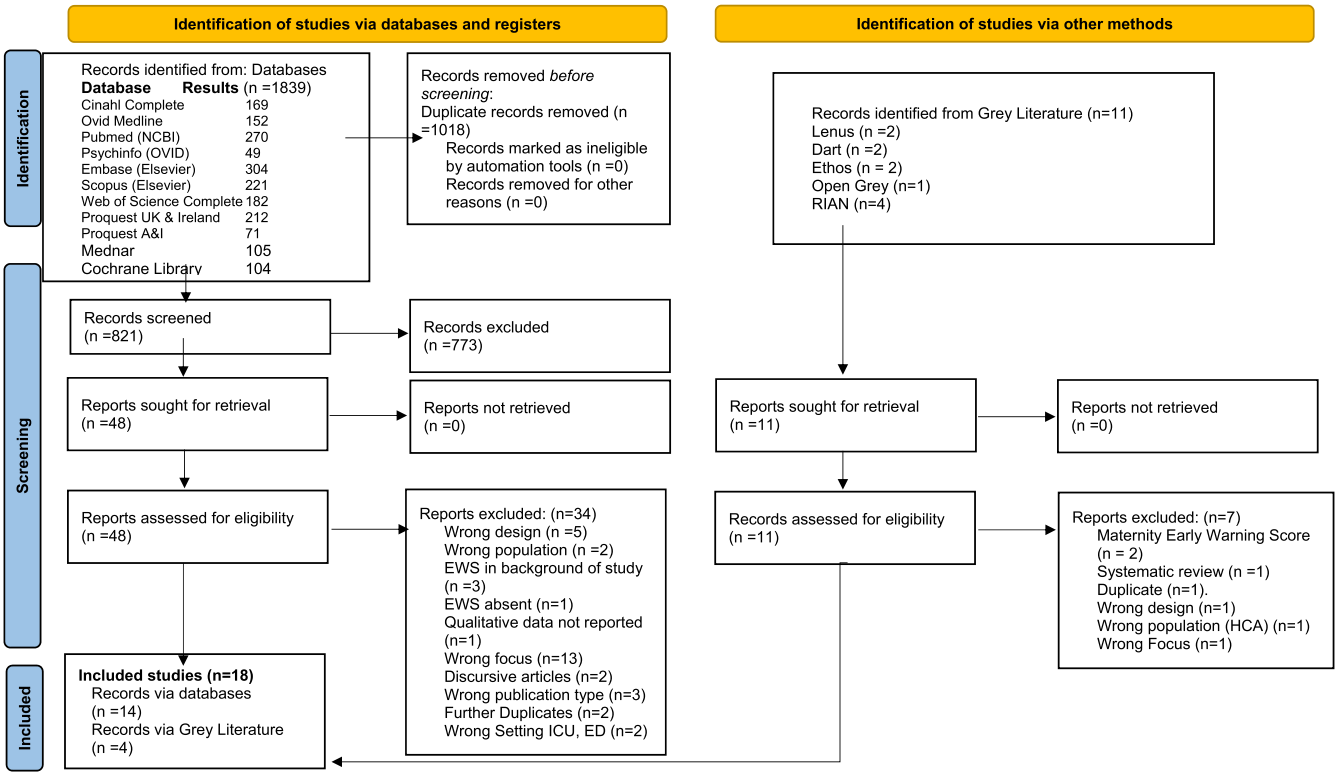


FIGURE 2 PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources

3 | RESULTS

Eighteen studies across seven countries were included in the final synthesis (12 qualitative studies, 4 mixed methods and 2 case studies) (Table 3). The studies were published between 2005 and 2020 and spread across three continents. Over 235 nurses are represented in the studies reflecting a diverse picture of nursing grades and years of experience (ranging from 5 months to 30 years). The track and trigger scoring tools used by nurses in the included studies were EWS (10 studies), MEWS (4 studies), NEWS (2 studies), T&T (1 study) and ORC (1 study). A sample verbatim quotation reflective of each finding is presented here with further illustrative quotes reported in (Table 7). Quotation pseudonyms are written as they appeared in primary studies. All findings have several representative quotes apart from finding 18 which refers to the hospital environment and its impact on nurses' escalation of care. This finding has only one quote reflective of this sub-theme, and as a result is listed as being of low confidence in CERQual Table (Table 7). This approach is deemed appropriate with arguments made for the inclusion of low quantity data as it can highlight areas for further research (Glenton et al., 2018). The resultant four analytical themes were (1) Marrying clinical judgement and EWS (2) SMART communication (3) EWS protocol—A blessing and a curse (4) Hospital domain. A conceptual model depicting the role of the nurse in balancing these competing suppositions in the context of a patients EWS was developed (Figure 3).

3.1 | Theme 1: Marrying Clinical Judgement with EWS

3.1.1 | Finding 1: Nurses strongly value using clinical judgement concurrently with the EWS tool

Twelve studies illustrated nurses' confidence in their clinical judgement when responding to patient deterioration and EWS (Andrews & Waterman, 2005; Donohue & Endacott, 2010; Ede et al., 2020; Elliott et al., 2015; Flenady et al., 2020; Foley & Dowling, 2019; Jensen et al., 2019; Lydon et al., 2016; Mackintosh, 2012; Mc Gaughey, 2013; Petersen et al., 2017; Suokas, 2010).

> *'You must use the tool and your clinical judgement. You must collect vital signs and think about the measurements, but you also must look at, touch, and listen to the patient and, together with the score, create a clinical picture; then all you have done has value. The whole point is that all of this is part of being a good clinician'. (Camilla, 22 years of experience)* (Jensen et al., 2019, *p. 4393)*

3.1.2 | Finding 2: The EWS tool should not be used in isolation

Solely relying on the EWS to determine whether a patient was deteriorating and consequently escalating care on this basis alone was

TABLE 3 Study characteristics

Study No.	Author	Year	Country	Design/Method	Sample	Analysis	Study Focus	CASP Score
1	Andrews and Waterman	2005	U.K.	Qualitative data in the form of Interviews and Observations. 44 interviews with a mean time of 55minutes. Observations lasting between 3 and 8 hours long.	Purposive sampling; one surgical and one medical ward of a teaching hospital. 30 Nurses 7 Doctors 7 Healthcare support workers.	Grounded theory (Glaser and Strauss 1967), cyclical nature, each interview was coded, open coding continued until patterns emerged followed by selective coding.	To investigate Ward staff experiences of the EWS system when communicating physiological deterioration.	9/10 -Researcher reflexivity not illustrated. -Limitation: confined to two wards only.
2	Cherry and Jones	2015	U.K.	Mixed Methods Design: Questionnaire and Focus Group.	Convenience sampling was chosen qualified nursing staff on the AMU were recruited. Quant Part: 9 nurses a questionnaire was given to 3 nurses from each of the NHS bands: Band5/Band6/Band7. Qual Part: The focus group consisted of 6 nurses, one band 7, one band 6 and four staff nurses.	Quant part: Descriptive and demographic data were presented using SPSS. Qual Part: Focus group findings were transcribed verbatim, and a framework analysis technique was used. This involves reading and reviewing of transcripts, identifying codes and themes from the data and refining them.	To explore the attitudes of qualified nursing staff using the MEWS system in an AMU in an acute hospital.	9/10 -Issues around Recruitment strategy.
3	Dalton et al	2018	U.K.	Qualitative, generic approach, semi-structured interviews. A modified validated questionnaire was used with permission from Mc Donnell et al 2013.	Purposive sampling, Medical and Surgical wards within an acute NHS trust. 10 Registered Nurses with 2 years post-reg experience and who can recall a retrospective or prospective account of caring for a deteriorating patient.	Traditional content analysis by researcher and participants themselves were asked to validate the transcript as a true reflection of their interview. Followed by Thematic analysis of data was selected this was chosen due to its compatibility with generic qualitative analysis.	To discover what factors, influence how nurses assess patient acuity and their response to patient deterioration.	9/10 -Researcher reflexivity not illustrated.
4	Donohue and Endacott	2010	U.K.	Qualitative design with Critical Incident Technique to structure data collection. Semi-structured interviews with nurses who had managed a patient referred to Outreach team.	Purposive Sampling 11 Registered nurses The nurses experience and seniority were evenly distributed All had managed a deteriorating patient, 3 were members of outreach team.	Thematic Analysis was used and applied to individual interview transcripts and then across transcripts to identify themes and categories in the data.	To examine nurses and critical care outreach staff perceptions of management of deteriorating patients.	8/10 -Researcher reflexivity not illustrated. -Ethics not addressed in text.

TABLE 3 (Continued)

Study No.	Author	Year	Country	Design/Method	Sample	Analysis	Study Focus	CASP Score
5	Ede et al	2020	U.K.	Qualitative Observational research with semi-structured ad hoc interviews.	55hrs of qualitative observations were conducted on 12 different medical and surgical wards at two hospital sites in one national health service trust	Thematic analysis using a grounded theory approach. Data were open coded. All text was coded under dominant themes present in passage of text and then axial coding took place where relationships were determined between themes followed by selective coding to further explore themes of high relevance to research question.	To map the barriers and facilitators to the escalation of care in the acute ward setting and identify those that are modifiable.	9/10 -Recruitment process not detailed ad hoc interviews. - COREQ 32-point checklist for reporting was used.
6	Elliot et al	2015	Australia	Qualitative Focus Groups: Semi-structured focus groups conducted by the site project officers.	Purposive sample: 8 trial sites were recruited, 44 focus groups with 218 clinical ward staff. Semi-structured Focus Groups. Median participants per group was 5 most were nurses. Staff had received training and used the charts in practice 2–6 weeks prior to study. Site	Thematic snalysis using inductive reasoning guided by Gibbs framework of 1) transcription 2) code building 3) dis/confirmatory theme development 4) data consolidation and Interpretation	Examines initial clinical user experiences and views following implementation of Observation and Response Charts (ORC) a Track and Trigger System in adult general medical and surgical wards.	8/10 -Unclear sample very broad description: 'most were nurses'. -Researcher reflexivity not illustrated.
7	Flenady et al	2020	Australia	Qualitative Interpretive Study. Phone interviews (none longer than 60 mins) were performed by two members of the research team.	Purposive and snowball sampling, participants were encouraged to share website link with colleagues. A total of 30 participants 10 medical officers (8 male, 2 female) 20 nurses (2 male 18 female). Located across 3 different hospital sites rural/ regional/ metro.	Thematic Analysis following Braun and Clarkes six stage Framework. Thematic review and theming of definitions was conducted independently by three researchers who discussed and documented findings during group meetings. This added to the rigour of the study.	To explore sociocultural factors influencing acute care clinician's compliance with an EWS used in Queensland public hospitals, Australia	9/10 -Researcher reflexivity not illustrated.

(Continues)

TABLE 3 (Continued)

Study No.	Author	Year	Country	Design/Method	Sample	Analysis	Study Focus	CASP Score
8	Foley and Dowling	2019	Ireland	Case Study design was adopted to explore views and experiences of nurses using the EWS on an acute medical ward. Data Triangulation was used including -non-participant observation - semi-structured interviews - document analysis.	9 nurses and 2 HCAs participated. (2 HCAS were observed, and 7 nurses were observed and interviewed) An 8th nurse was interviewed but not observed.	Systematic Text condensation was used (Maltreud, 2012). This is a 4-step approach to analysis that is influenced by Giorgi's four step phenomenological method. -Interview and Observation data were read to gain an overall impression. - Units of meaning were identified that focused on EWS practice and were collated together. -Units of meaning were then reviewed by authors in the context of the documents reviewed. -Lastly, the overall units were synthesised into relevant themes incorporating all three data collection methods.	To describe how nurses use the EWS in an acute medical ward and their compliance with the EWS and to explore their views and experiences of the EWS.	9/10 -Researcher reflexivity not illustrated.
9	Gazarian et al	2010	U.S.A.	Qualitative, descriptive study using the critical decision-making method to describe the nurse's decision-making process in a prearrest period. Interviews were conducted.	Purposive sampling assured the inclusion of several types of incidents (CPA, transfer to ICU or a RRS consult) and ensured these events involved a staff nurse competent in identifying patient deterioration and activating RRS. 13 female Registered Nurses on four medical wards who had experience of a prearrest period participated.	Cognitive Task Analysis consisting of four phases: -Preparation -Data Structuring -Discovering Meanings -Representing Findings. Two complementary approaches to analysis were used in the study A structured approach using a priori framework based on research questions. In this process unanticipated patterns and themes emerged. Followed by analysis of emergent themes.	To describe the cues and factors that influence nurses in their decision-making process when identifying and interrupting a potentially preventable cardiopulmonary arrest.	−9/10 -Researcher reflexivity not illustrated.

TABLE 3 (Continued)

Study No.	Author	Year	Country	Design/Method	Sample	Analysis	Study Focus	CASP Score
10	Greaves	2017	U.K.	Qualitative study using constructivist grounded theory. 40 interviews were conducted. Interview tool was piloted. Data triangulation took place across participants, professions and teams.	Purposive Sampling: taken from 2 acute healthcare trusts in the North of England. A general surgical and a medical admissions unit both using the same MEWS system. Doctors, Nurses, and Healthcare assistants: (n = 40). Foundation year 1 (House officer) Doctors: 6 Foundation year 2 (Senior House Officer) Doctors: 6 ST Trainees (Senior House Officer) Doctors: 4 ST Trainees (Senior Registrar) Doctors: 2 Consultants:4 Staff Nurses: 6 Ward Sisters: 6 Ward Managers: 2 Care Assistants: 6 Executive Director of Nursing:1 Executive Director of Patient Safety:1	Thematic analysis: themes were identified that provide a description of the observed phenomena, core concepts emerged, allowing the construction of theory.	To investigate how issues between professions, issues between disciplines, and authority patterns affect the medical and nursing team's responses to critical events in the context of formalised protocols for the management of adult patient deterioration.	9/10 -Recruitment strategy issues: The refusal of any of the nurses from the Philippines to take part in the study which made up 10% of the workforce and were employed on grade 5 the most junior level of the RN bands.
11	Jensen et al	2019	Norway	Qualitative study with a hermeneutic design, semi- structured in-depth interviews.	Purposive sampling 14 nurses (1 male, 13 female) from different medical-surgical and rheumatology wards in a state funded hospital. Nursing leaders in hospital asked bedside nurses to participate. Participation was voluntary. All participants held a 3-year bachelor's degree in nursing and professional certification. Experience ranges from 5months to 22 years. The data were collected 1 year after the implementation of the NEWS.	Thematic Analysis was used to analyse the data (Braun and Clarke 2006). A hermeneutic circle was used to facilitate a deeper understanding of the interview text, this involved moving back and forth between parts of the data and data set when interpreting findings.	To explore hospital ward nurses' experiences with the NEWS and its impact on their professionalism.	9/10 -Recruitment strategy did not elaborate on why participants were selected from these wards in particular.

(Continues)

TABLE 3 (Continued)

Study No.	Author	Year	Country	Design/Method	Sample	Analysis	Study Focus	CASP Score
12	Lydon et al	2016	Ireland	Mixed Methods: Qualitative phase, nurses and doctors participated in a series of semi-structured interviews. Quantitative phase, nurses and doctors responded to a questionnaire designed to assess attitudes towards the PTTS and factors that influence adherence to protocol.	Participants were recruited using judgement and snowball techniques, interns were asked to identify other potential participants. Qual part: 30 participants comprised of −10 nurses −2 NCHD −18 interns Quant part:215 Participants (24.1% response rate) −80 nurses −29 interns −58 NCHDS −31Consultant −17 respondents did not specify	Qual Part: Deductive content Analysis was used to analyse data. Qualitative analysis using the Theory of Planned Behaviour (TBP) paradigm which provided background for the Construction of a TPB questionnaire for Quant phase. Quant Part: Questionnaire used: Cronbachs α's to analyse data following these subscales were scored. Descriptive statistics were used.	To examine the perceptions of a national PTTS amongst nurses and doctors and to identify the variables that impact on intention to comply with protocol.	8/10 -Issues around Recruitment strategy. -Researcher reflexivity not illustrated.
13	Mackintosh	2012	U.K.	Qualitative methodology: Ethnographic approach was chosen as an effective means of exploring frontline work practices. Observation of interactions amongst multi-professional healthcare staff and patient management processes, and semi-structured interviews.	Ethnographic fieldwork over a 12 month period in two UK NHS Trusts general medicine was selected in both sites. The research included health care assistants, nurses, doctors, managers and documentary analysis. 180 hours of Observations Interviewees were purposively selected for theoretical representativeness, in terms of categories, substructures and networks from the social organisation. 35 interviews: Doctors:14 Ward Nurses: 7 Critical Care nurses: 2 Healthcare Assistants:4 Safety Leads and Managers:6 Trust Lawyer: 1	The Framework approach was followed, which involves a series of interconnected stages that enable the researcher to move back and forth across the data until a logical report emerges (Ritchie & Spencer 1994, Ritchie & Lewis 2003). This enables both inductive and deductive coding frames to be linked together and develop a conceptual framework (Smith & Firth 2011).	To explore rescue practices to draw out the associated interplay of sociocultural and organisational processes and the context of clinical work within medical wards.	9/10 -Data collection Issues: Interviews were largely done with Senior staff as opposed to junior staff.

TABLE 3 (Continued)

Study No.	Author	Year	Country	Design/Method	Sample	Analysis	Study Focus	CASP Score
14	Mc Donnell et al	2013	U.K.	Mixed Methods Design: before and after study. Survey and Semi-structured Interviews. The questionnaire was based on a pre-existing instrument with face and content validity. The questionnaire was piloted with staff on a ward not included in the study.	Quant Survey: All Nursing staff who undertook observations on the 12 wards included in the study and were eligible to attend training session on the new track and trigger tool. Participants were given questionnaires at the start of each training session and six weeks after the introduction of the new tool. Total surveyed: 213 Qual Part: Purposive Sample 15 Nursing Staff were selected to ensure a range of participants in terms of grade/ward/ years qualified. Participants were interviewed before the training and six weeks after the introduction of the new tool.	Quant Part: data analysed using SPSS (paired t tests, McNemar tests) Qual part: interviews analysed using thematic framework analysis (Ritchie and Spencer 1994) this approach allows the integration of pre-existing themes into the emerging data analysis and provides a clear analytical structure. Five techniques: Familiarisation identifying a thematic framework. Indexing charting Mapping. interpretation.	To Evaluate a new Track and Trigger model for the detection and management of deteriorating patients on nursing staffs Knowledge and Confidence in an acute hospital.	9/10 -Researcher relationship or background not illustrated.
15	Mc Gaughey	2013	Northern Ireland (Belfast)	Multiple Case Study approach of four wards in two hospitals in Northern Ireland. It followed the principles of realist evaluation research which allowed empirical data to be gathered to test and refine RRS programme theory. A variety of mixed methods were used to test the programme theories including individual and focus group interviews, observation, and documentary analysis of EWS compliance data and ALERT training records.	Purposive sampling Stage 1: Interviews with policymakers. Stage 2: key informants' Individual interviews and focus group interviews Focus groups included: ■ 6–8 ward nurses from each ward (Medical & Surgical) in the two case sites who have experience and knowledge of EWS and ALERT (n = max 32) ■ 6–8 health care assistants from each ward (Medical & Surgical) in the two case sites involved in recording and reporting patient observations and using EWS (n = max 32) Non-participant observation was used to collect data about the organisation, structure and working conditions of the ward. EWS compliance data were collected to provide information on accurate completion of EWS charts in practice.	A cross-case analysis of the findings from the interviews, observation and audit data allowed similarities and differences to be identified across case sites, medical and surgical wards and key informants. The qualitative and quantitative data analysed from Stage 1 and 2 were triangulated to enhance the completeness and robustness of the conclusions. The transcripts were coded according to the seven key factors from the Greenhalgh et al (2004) framework to allow indexing and retrieval in NViVO7 software (QRS 2006). To enhance reliability and reduce bias, the emerging categories were cross-checked by a member of the supervisory team.	To evaluate factors that enabled or constrained implementation and service delivery of early warnings systems (EWS) and acute care training in practice to provide direction for enabling their success and sustainability.	9/10 -Researcher relationship not illustrated.

(Continues)

TABLE 3 (Continued)

Study No.	Author	Year	Country	Design/Method	Sample	Analysis	Study Focus	CASP Score
16	Petersen et al	2017	Denmark	Qualitative study focus groups were conducted with nurses from a medical acute care ward and a surgical acute care ward.	Purposeful sample. Potential participants were nominated by the head nurse of each ward. Only nurses with at least 3 months of employment on the ward were eligible to participate. 18 nurses were enrolled: 7 surgical (26% of total nurse staff) and 11 medical (20% of total nurse staff). Participation was voluntary. Five Focus groups with a total of 3–5 participants in each. Aim was to include 2 nurses from each ward in a focus group.	Krippendorff's components of text driven content analysis: -Unitising -Sampling -Coding -Reducing -Abductively and Inductively inferring contextual phenomena -Formulating answers to the research questions.	To examine the barriers and facilitators amongst acute care nurses to three aspects of EWS protocol: 1) adherence to monitoring frequency. 2) call for junior doctors to patients with an elevated EWS. 3)call for the medical emergency team.	9/10 -Few verbatim quotes provided more sufficient data needed to support findings.
17	Stewart et al	2014	USA	Mixed Method design: Quantitative Part: a retrospective review of medical records from before and after implementation of a MEWS system. Qualitative Part: nurse-led focus groups exploring the use of the MEWS in clinical practice.	Voluntary sample of 11 nurses who worked on three medical and surgical wards units under study. All registered nurses who worked on these units were eligible to participate in the focus groups. −5 focus groups with between 1–4 attendees were conducted.	Quant part: Statistical package for social sciences (SPSS) and graph pad were used. Statistical methods: descriptive statistics, independent sample *t* tests and $_{x}^{2}$ tests Qual Part: Thematic Analysis was used. The Principal investigator and a research assistant held a debriefing session. Transcripts were analysed using a qualitative technique like that described by Casey (1998). The summation of responses to each question from all 5 focus groups was merged into one transcript. Themes were extracted through commonly used words and phrases. A third independent researcher not associated with the hospital or subject matter provided an in-depth thematic analysis of the transcripts. The principal investigator and independent researcher discussed their interpretations until agreement was reached.	The study had two parts: To retrospectively review medical records pre- and post-implementation of the MEWS system in relation to RRS activations and Cardiopulmonary arrests amongst non-monitored patients in 3 medical-surgical units. Nurse-led focus groups explored use of the MEWS in clinical practice and nurses' perceptions of barriers and facilitators to use of the MEWS at the bedside.	8/10 -Recruitment strategy issues. -Ethics not addressed in text.

TABLE 3 (Continued)

Study No.	Author	Year	Country	Design/Method	Sample	Analysis	Study Focus	CASP Score
18	Suokas	2010	U.K.	Qualitative design: ethnography interviewing and participant observation. Phase 1 data collection: Interviews and ethnographic observations in four medical wards: 28 days of observation and 50 staff interviews. Phase 2 data collection: Interviews and ethnographic observations in four medical wards: 20 days of observation and 41 staff interviews. Phase 3 data collection: Co-facilitated focus and ward-based feedback groups: Eight focus groups and seven ward-based feedback groups.	Purposive sampling to engage a range of different healthcare staff who use or manage the early warning system. 37 semi-structured interviews were conducted with doctors, nurses, medical and nursing staff who respond to EWS alerts, and staff from patient safety and risk management. The sample included: −7 doctors −7 senior nurses −7 staff nurses −2 healthcare assistants −6 members of staff from outreach/ hospital-at-night teams −8 members of staff from patient safety/ risk management	Situational Analysis: an extension of the grounded theory analysis developed by Glaser and Strauss (1967). Clarkes Situational Analysis approach which is useful in multimodal research makes 3 kinds of maps to analyse the data: situational maps, social worlds and positional maps. Firstly, deductive methods were used to develop research questions and ideas for data collection, which will then influence the analysis. Then an inductive approach was followed, the analysis of interview transcripts explored the processes of recognition and response that emerged from the data and produced a thematic coding framework.	To describe and conceptualise an organisational process that involves construction, execution and contestation of the procedural standards prescribed by early warning systems to detect and manage the deteriorating patient.	9/10 -Issues around recruitment strategy purposely selected participants for interviewing that researcher felt would be key informants following field observation.

TABLE 4 CASP (2017) quality assessment table

	1. Was there a clear statement of the aims of the research	2. Is a qualitative methodology appropriate?	3. Was the research design appropriate to address the aims of the research	4. Was the recruitment strategy appropriate to the aims of the research?	5. Was the data collected in a way that addressed the research issue?	6. Has the relationship between the researcher and participants been adequately considered?	7. Have ethical issues been taken into consideration?	8. Was the data analysis sufficiently rigorous?	9. Is there a clear statement of findings?	10. How valuable is the research?
1. Andrews and Waterman (2005)	YES	YES	YES	YES	YES		YES	YES	YES	YES
2. Cherry and Jones (2015)	YES	YES	YES		YES	YES	YES	YES	YES	YES
3. Dalton et al. (2018)	YES	YES	YES	YES	YES		YES	YES	YES	YES
4. Donohue and Endacott (2010)	YES	YES	YES	YES	YES			YES	YES	YES
5. Ede et al. (2020)	YES	YES	YES		YES	YES	YES	YES	YES	YES
6. Elliott et al. (2015)	YES	YES	YES		YES		YES	YES	YES	YES
7. Flenady et al. (2020)	YES	YES	YES	YES	YES		YES	YES	YES	YES
8. Foley and Dowling (2019)	YES	YES	YES	YES	YES		YES	YES	YES	YES
9. Gazarian et al. (2010)	YES	YES	YES	YES	YES		YES	YES	YES	YES
10. Greaves (2017)	YES	YES	YES		YES	YES	YES	YES	YES	YES
11. Jensen et al. (2019)	YES	YES	YES		YES	YES	YES	YES	YES	YES
12. Lydon et al. (2016)	YES	YES	YES		YES		YES	YES	YES	YES
13. Mackintosh (2012)	YES	YES	YES	YES		YES	YES	YES	YES	YES
14. Mc Donnell et al (2013)	YES	YES	YES	YES	YES		YES	YES	YES	YES
15. Mc Gaughey (2013)	YES	YES	YES	YES	YES		YES	YES	YES	YES
16. Petersen et al. (2017)	YES	YES	YES	YES	YES	YES	YES		YES	YES
17. Stewart et al. (2014)	YES	YES	YES		YES	YES		YES	YES	YES
18. Suokas (2010)	YES	YES	YES		YES	YES	YES	YES	YES	YES

perceived negatively. It was viewed as a far more multifaceted issue which requires consideration of data gathered from other sources, even if the other sources are less tangible. Participants in six studies voiced the importance of using clinical judgement, visually assessing and listening to the patient together with the knowledge gained from the EWS (Flenady et al., 2020; Greaves, 2017; Jensen et al., 2019; Mc Gaughey, 2013; Stewart et al., 2014; Suokas, 2010).

> *'.. you need to still be able to look at observations or even still look at your patient without having to use an Early Warning Chart to tell if your patient is unwell or not. It should be an in-hand system, but it shouldn't be a "the" system. I think it's a combination of knowing your patient and being able to use the tool'. (Surgical ward staff nurses 02[07])* (Mc Gaughey 2013, *p. 199)*

3.1.3 | Finding 3: Nurses value their knowledge, experience and intuition in assessing risk

Thirteen studies demonstrated nurses' use of experience, knowledge and intuition when escalating care (Dalton et al., 2018; Donohue & Endacott, 2010; Ede et al., 2020; Elliott et al., 2015; Foley & Dowling, 2019; Gazarian et al., 2010; Greaves, 2017; Jensen et al., 2019; Mackintosh, 2012; McDonnell et al., 2013; Mc Gaughey, 2013; Petersen et al., 2017; Suokas, 2010).

> *'I have many years under my belt within this speciality. I know when a patient is unwell and know what would happen if I don't act upon it, so I would ask the doctor to review the patient and document it' (PO1)* (Dalton et al., 2018, *p214).*

3.1.4 | Finding 4: EWS use enhances sense of accountability and makes individual responsibilities explicit

Nurses' awareness of their responsibility and how they can be held accountable for their actions when deciding whether to escalate care or not in response to EWS was a prevalent theme in seven papers (Dalton et al., 2018; Donohue & Endacott, 2010; Greaves, 2017; Jensen et al., 2019; Mackintosh, 2012; Mc Gaughey, 2013; Suokas, 2010).

> *'We can trace back as to who was looking after the patient so there's more accountability. You know, we can say to people well, look this person's EWS score was five and you didn't do anything about it, why is that… so yeah, they do take more responsibility' (Senior Nurse (33))* (Suokas, 2010, *p 156).*

TABLE 5 Summary of thematic development

DEVELOPMENT OF FINDINGS TABLE (Visual Map of Theme Development using Thomas & Harden's Three Stage Thematic Synthesis Approach to Data Analysis)			
Four emerging themes			
1) Marrying Clinical Judgement and EWS	**2) SMART Communication**	**3) EWS protocol a blessing and a curse**	**4) Hospital Domain**
Descriptive Theme (below) Supporting the above Analytical Themes STAGE TWO			
a) Confidence in Clinical judgement. b) Responsibility and Accountability. c) Experiential knowledge and Intuition. d) Seeing the patient not just the numbers.	a) Credible objective measure. b) Perception of communication and teamwork. c) Effectual EWS training. d) Challenges of EWS modifications.	EWS protocol a blessing a) Nurse empowerment. b) Supports decision making. c) Protection from liability. EWS protocol a curse d) When abnormal is normal. e) Restrictively prescriptive. f) Not fool-proof.	a) Hierarchical Influences. b) Staffing, workload and lack of resources. c) Delayed medical response. d) Out of hours support. e) Physical Environment.
Coded findings (line by line coding) contributing to the above descriptive and later analytical themes STAGE ONE			
a) As confidence grows there is a greater emphasis on clinical judgement than EWS. b) Nurses are responsible for collecting and acting on vital signs. c) Natural intuition develops through experience. d) An in-hand system not 'the system' need to look at your patient.	a) EWS provides you with a formula to escalate care and get a response. b) Non-medical language can expose you to ridicule. c) Incorrect calculation of EWS score. d) Reluctance from doctors to write down EWS modifications.	a) EWS protocol removes fear and empowers. b) EWS findings validate and strengthen decision making. c) Backed up by policy and protocol. d) COPD patients' abnormal measurements is their normal. e) EWS chart can be overly prescriptive. f) MEWS score failed to signal deterioration	a) Senior nursing position instils confidence in not only escalating care but to whom one escalates care. b) Unachievable targets due to heavy workload. c) Delays in doctor response and attendance. d) High score at night requires more precision when escalating. e) Modern hospital layout.

TABLE 6 Themes and illustrative quotations

Marrying Clinical judgement and EWS	
Confidence in Clinical judgement	*'Sometimes still you're saying, 'They're scoring 4 but that's probably quite good for her because she's back from ITU'. So again, you'd report it to the doctor, but you'd say, 'I don't think it's a particular problem.' So, you'd try and put some perspective on it, so that they're not abandoning somebody else who is quite poorly'.* (Sister14 years) (Andrews & Waterman, 2005, p478). *'I don't call a Doctor when the MEWS [score] tells me to; I'd call them when I think the patient needed it'.* (CIA) (Donohue & Endacott, 2010, p12). *'Ward 12: …discussed the [EWS]…from his experience…patients rarely trigger on the ward, but if they do, he uses his clinical judgement as well as the [EWS] to assess the situation, he states he does not solely rely on the numbers generated and looks at the individual patient's history and current management'.* (Ede et al., 2020, p 174). P10_RN reports: *'there is some open hostility to the form from staff who've been around for 20–30 years. They'll tell you day in and day out that the form's a load of sh..t and takes away from clinical judgement'.* (Flenady et al., 2020, p4 of 9). *'I use my own judgement no matter what NEWS indicates. I summon the doctor when I think my patient is deteriorating, regardless of the NEWS score. Maybe other nurses summon support earlier and faster than me. I see the advantage of NEWS as a tool if you are new and have little experience, so I can see that it can be helpful, but I think, for my part, I would have made the same assessment regardless of whether I had it [NEWS] or not'.* (Gunhild, nine years of experience) (Jensen et al., 2019 p4392). *'Senior nurses might see a high NEWS but use clinical judgement to assess the patient and inform the intern that, even though the NEWS is high, the patient is stable'.* (Nurse 4) (Lydon et al., 2016, p690). *'In acute medicine, as I mentioned earlier, somebody's EWS score can be slightly elevated at baseline and as we get to know our patients, particularly in acute medicine the nurses can use their judgement to decide how frequently to do somebody's obs and to apply a rule, 'they must be done 6 hourly, 8 hourly, 12 hourly…', doesn't lend itself to the uniqueness of medicine … I've worked in medicine, I've worked in surgery, cardiology, theatres, ICU, I've been all over and there's different reasons for doing obs at different frequencies in all of those areas, but I think you have to allow us to interpret it to use it at its best advantage'.* (Medical Ward, Nurse Manager 01 [02]) (Mc Gaughey, 2013, p200).
b. Responsibility and Accountability	*'If you had a patient you considered to be deteriorating in health and their MEWS score was 7 or above, but the doctor on the ward said, 'this is fine, we already know about this', what would be your action?' 'I would document I had spoken to the doctor and his/her reply; that's their decision, not mine'.* (P06) (Dalton et al., 2018, p214). *'We are responsible for following up on what is being done or what we are going to do. It's not such a dramatic difference, really. We have always been responsible for collecting vital signs, for following up, and for paying extra attention to deteriorating patients'.* (Heidi, four years of experience) (Jensen et al., 2019, p4393). *'In a way, you could say that you have less responsibility for patient care. When NEWS and the prescribed frequency of measurements and response are followed, you have done the right thing. So, if something happens, at least you've followed the recommendations, and you can blame NEWS. However, I feel that it is my responsibility; I should have detected changes, since I am in charge of the patient'.* (Fiona, one year of experience) (Jensen et al., 2019, p4394). *'We can trace back as to who was looking after the patient so there's more accountability. You know, we can say to people well, look this person's EWS score was five and you didn't do anything about it, why is that… so yeah, they do take more responsibility'.* (Senior Nurse (33)) (Suokas 2010, p156). *'if the doctor doesn't come as soon as I'd like, it's the doctor's decision, but at the same time it's my patient and my ward and I would still feel responsible for them. If I felt strongly, I would contact someone else rather than just [accepting] 'oh I've spoken to whoever and this is the situation'.* (Westborough, Nurse, 5) (Mackintosh, 2012, p214). *'You see I'd been off, and I came back in… we had a lady who had been running a tachy of a hundred and thirty plus for three days and we were doing [the obs] on a regular basis and telling the doctors, telling the doctors, nothing happening. I said she cannot sustain this, I said she's elderly, she is not going to sustain this rate for much longer. I really to this day do not understand the rationale for why nothing was done […] one of her other medications could have been increased to try and have an impact on this … whether everybody was waiting for a consultant decision or whatever I do not know. I said she's definitely going to go off and she did, but they were all aware so that's how come they were able to resuscitate her and bring her back, but unfortunately it wasn't a very successful resuscitation. My consultant said what did you bother for, and I said because she was for all active treatment, she is somebody's mother, and nothing was documented anywhere to say that I shouldn't … I'm my patient's advocate, and I said if nobody else will do it that's my job, I will'.* (Senior Nurse (32)) (Soukas, 2010, p259). *'I want them to take it seriously. They really should come and look. I know they have got a lot on, but when a patient suddenly scores it's their job to sort out'.* (Sister 2, line 75) (Greaves, 2017, p136).

TABLE 6 (Continued)

Marrying Clinical judgement and EWS	
c. Experiential Knowledge and Intuition	*'I have many years under my belt within this speciality. I know when a patient is unwell and know what would happen if I don't act upon it, so I would ask the doctor to review the patient and document it'* (PO1) (Dalton et al., 2018, p214). *'I'd like to think that it hasn't made any difference to me being able to detect my patient deteriorating'.* (FG I1) (Elliot et al., 2015, p70). *'I went to nursing school for three years—I know when it's time to ring the doctor'.* (FG A4) (Elliot et al., 2015, p70). *'Knowing that he was away from his baseline, at baseline he was a little vague, but just by knowing him you could tell'.* (Gazarian et al., 2010, p29). *'Yeah, I think to be honest the more experienced staff it is a complete insult to give them an early warning score they must follow because if you can't use your skill and knowledge base to actually look at a patient to say you're not well then I think it is a disgrace. I think at grades of staff I think people are promoted far too quickly in grades anyway and they still lack the basic experience about a few years of developing their expertise and some people will stay on one Ward for all of their career and I would challenge their expertise and their knowledge and maybe they need another system to be able to help them in their diagnosis and recognition of deterioration. So, I don't think grades come into it as such but certainly experience yes as less experienced people need a guide whereas experienced staff sometimes it is just a bit of paper which will work which they will fill in and get help anyway'.* (Modern Matron 2 line 60) (Greaves, 2017, p163). *'That's something I've learnt was listen to your intuition. Because I found more often than not that it was telling me things that I should have been listening to anyway, so since then I think I do listen to it, I don't just dismiss it straightaway. [I would] just keep an eye on them, keep going back to them. [..] Yeah, it's just like looking for other signs like they're not being themselves'.* (Eastborough, Nurse, 5) (Mackintosh, 2012, p188). *'they can also not score anything and still not be you know, there's something wrong and you can see that. And often like nurses who have experience their intuition us telling them that there's something wrong'.* (3) (Mc Donnell et al., 2013, p48). *'(…) we [nurses] use our clinical intuition to see the patient an extra time and take an extra set of vitals, because you have some alarm bells ringing. If something just doesn't seem right, I prefer to take an extra EWS score even though nothing sticks out, because there is something you just can't define (…)'.* (Petersen et al., 2017, p5 of 9).
d. Seeing the patient not the numbers	*P22_RN 'this is a blunt tool; I know how to deal with this patient and get the help that I need when I need it…. the vital signs are the beginning of your nursing assessment really. If someone has abnormal respiratory rate, then I'm much more concerned about that than what number they're showing. If I have an asthmatic patient and their respiratory says only 24 but you can hear them wheezing and they're really tight and there's not a lot of air moving, then I'm much more concerned about that, and would escalate that much quicker'.* (Flenady et al., 2020, *p4 of p9).* *'When I use my clinical judgement or my intuition, my gut feeling, I don't only look at the measurements; I look at how the person is affected by the measurements. I consider their breathing … are they wheezing, are there any sounds? I look at and touch the patients. I have been a nurse for a while, so you learn to look at the patients in a slightly different way than just using the system'. (Marie, five years of experience)* (Jensen et al., 2019, *p4393).* *'.. you need to still be able to look at observations or even still look at your patient without having to use an Early Warning Chart to tell if your patient is unwell or not It should be an in-hand system but it shouldn't be a 'the' system..I think it's a combination of knowing your patient and being able to use the tool'. (Surgical ward staff nurses 02[07])* (Mc Gaughey, 2013, *p. 199)* *'Everybody is different – we treat the patient, not the numbers'.* *'One patient may be very stable with a MEWS of 4; another patient might not do as well. You treat the individual'. (*Stewart et al., 2014, *p226).* *'It's a guideline; you're still looking at the patient, that's the one thing that everyone tends to forget. You can be working with a patient all day, and even if you did do obs once in the morning and once in the afternoon, you'll still get a better idea how well that patient is doing just by looking at them and being in contact with them'. (Senior nurse (31)) (Suokas 2010, p243).*

(Continues)

TABLE 6 (Continued)

2) SMART Communication	
a. Credible Objective Measure	*'It provides what you need to get a doctor there, I think. It gives you…your full objective facts. They can't argue with a score of 5 or 6. They'll just come. It's a complete measure which they do agree to attend to, and it helps your patients more than anything, which is important'.* (Staff nurse, 1 year) (Andrews & Waterman, 2005, p478). *'WARD 7: …took over a patient who had only had 100mls of urine … in 11 hours, … patient was quite unwell …felt the thing that worked well…once she flagged up the problem…she had good communication between the team and the doctors acted on her concerns very quickly'.* (Ede et al., 2020, p175). P14_RN commented: '*the more junior nurses say I have a 5, this is what I need to be doing'. P08_RN pointed out the usefulness of a score: 'it gives them (junior nurse clinicians) a concise idea of how sick their patient is'* (Flenady et al., 2020, p4 of 9). [Extract from field notes, Westborough, FN6]. 'On *a nightshift, E, the nurse in charge and I are discussing the nurses' role in escalation of care. She notes she has witnessed others being bullied, where doctors have said they have been too busy to come, often saying that there were other patients just as sick. E comments that these nurses were too descriptive in calling for help and not assertive enough. She contrasts this with her behaviour; 'I just come to the point, I'll say, Patient's drowsy, hasn't passed urine, is scoring and is clammy. If the doctors say they are too busy and can't come I'll say, Well, I'll find someone who can'. She notes one recent instance where she called the registrar and the registrar said, 'Why isn't the F1 coming to see the patient?' She explained that the F1 said she was too busy to see the patient, and the registrar said, 'Well that's fine, I'll take it up with the F1 and sort it out,' and five minutes later the F1 was on the ward'.* (Mackintosh, 2012, p213). *'Depending on what you tell them on the phone determines how urgent they consider it to be. It's just having the experience to know what to do with it (the score) and then following it through and getting somebody to actually look at this or come and review this patient'* (4) RGN 1–5 years' experience (Mc Donnell et al., 2013, p46). '*MEWS is helpful if you say, 'the patient is a MEWS 4 or 5'. Physicians recognize that they need to see the patient right away'.* (Stewart et al., 2014, p226).
b. Perception of communication and teamwork	*'It's easier to act dumb and say, 'This lady in here, her breathing is very fast', rather than 'She's got a high respiration rate'. I think it can come across to them (doctors) that you don't know what you're talking about. They question everything, so you might as well just say that's what you've seen in lay terms'.* (Staff nurse, 1 year) (Andrews & Waterman, 2005, p 477). '*Even though you ask them, it doesn't matter just come, they are lazy'.* (P1) (Cherry & Jones, 2015, p 816). '*We have a mutual respect. My knowledge is ward-based, so we work well together. I can point them in the right direction, and they respect my experience. They always call the shots - their knowledge is far greater than mine'.* P03 (Dalton et al., 2018, p214). '*I have often spoke to the doctor and said, 'this lady is really not right, but her MEWS score is 3' and the doctor just says, 'If I get time, I come and see the patient, but I have a number of things to do first.' You feel stupid sometimes if you're wasting people's time'.* (P05) (Dalton et al., 2018, p214). '*Ward 4: Observed interaction between doctors and nursing staff – very tense. Doctor storms off. 'I guess we'll agree to disagree'. …Would be difficult for someone not confident to escalate problems to someone who is very dismissive. When discussing patients, he is not giving eye contact and showing defensive postures'* (Ede et al., 2020, p176). '*Because they knew me, and what type of nurse I was, and I knew them, we were able to trust each other'.* (Gazarian et al., 2010, p27). '*I sometimes think that the medical staff don't appreciate what the nurses do to look after the patients, and the MEWS is a way to get them involved'.* Staff Nurse 1 line 81 (Greaves, 2017, p171). '*Sometimes we reflect in the patient's room, but also in the staff room. This weekend we discussed an unspecified patient … all the vital signs were normal, but the patient's consciousness had changed, and the patient had an infection and liver failure. We were waiting for the doctor's supervision and we started to plan what we might have to do. … Working with other experienced nurses helps you feel more confident; you can ask questions and get some feedback and support in assessment'.* (Heidi, four years of experience) (Jensen et al., 2019, p4395). '*Where I came from, we used to have a registrar there, I think he's been there for many years; if I walk into the hospital on a weekend and he's on-call I'm confident. [..] But here, because you have so many doctors to deal with, it's really very difficult to … to assess their competence'.* (Eastborough, Nurse, 6) (Mackintosh, 2012, p252). '*I think it's sometimes about personalities because sometimes you find that personalities of both nurses and doctors and it's just their own personality in itself, there's nothing you can do to change that, makes it difficult in some ways for them because some nurses are quite timid, and they maybe don't have the confidence and are afraid then to make that call. Whereas other nurses are confident, but they could also meet with a very confident young doctor who thinks, 'I know it all', and 'what are you calling me for?' So, you do have that and sometimes it is, and that's going to be a very hard thing when you're dealing with actual people's personalities to overcome'.* (Senior Nurse Manager C 02 [27]) (Mc Gaughey, 2013, p221).

TABLE 6 (Continued)

2) SMART Communication	
c. Effectual EWS training	*'One of the things I have a problem with, I suppose I don't use the proper correct language, maybe. I haven't gone any deeper into physiological training or physiological terms necessarily, and I feel that probably I don't use the right language when I'm trying to get a doctor to come and see the patient'.* (Sister, 10 years) (Andrews & Waterman, 2005, p477). *'Not being taught properly,' P1. 'She had scored, I think, a 1 when it was really a 3,' P2. 'You get some people who do not even ask if they have passed water or checked if [they have] by going back but just put a 0 anyway,'* P5. (Cherry & Jones, 2015, p816). *'We should be educating junior staff to look for more than just teaching them to use colours'* (FG A6) (Elliott et al., 2015, p 70) *'Well, I had a case with a patient who came in, who actually seemed to be in pretty good shape apart from an elevated respiratory rate. Before we had learned something from NEWS, I didn't think much about the respiratory rate, but because it was elevated, I had to take new measurements in a few hours, and by then his condition had deteriorated. Then I saw that respiratory rate is often one of the first things affected when the patient is deteriorating. … I have realised that the respiratory rate is important and, if I had not used NEWS, then I might not have conducted that reassessment'.* (Fiona, one year of experience) (Jensen et al., 2019, p4393). *'what we found was, repeatedly, that their scores weren't being done correctly, they were missing some parameters, the higher the score the more chance there was that it wasn't added up correctly and that was a frequent finding that whenever they had totted them up they had got the wrong number and obviously that could change the response that was required. The other thing is that at all of our Crash calls we will document what the Early Warning Score was prior to the Crash call and the time and we are finding that yes, sometimes and on a regular basis the scores are low but quite often their scores aren't low, they're high, maybe 6 hours earlier but their obs haven't been repeated'.* (Senior Nurse A 01[03]) (Mc Gaughey, 2013, p205). *'I think if you compare it to maybe two or three years ago then there is an improvement, but there is still room for [improvement]. There are still some patients that are slipping through the net, and there are still some areas where Early Warning Scores are being triggered and the appropriate action is not taking place'.* (Senior nurse (15)) (Suokas, 2010, p175).
d. Challenges of EWS Modifications	*'getting the doctors to fill in the modification … a nightmare'.* (FG I3) (Elliot et al., 2015, p69). P16_RN explained: *'I've rung the doctor; they didn't do the mods (did not write modifications on the EWS chart) that they'd written on the chart (patient notes within the chart) that they would do. I could do a MET call, but they've written in the chart (patient notes) that this is their mods, nurses have to cherry-pick doctors'.* (Flenady et al., 2020, p5 of 9). *'SHOs do not set parameters yet they are the ones re-viewing the patient…. you ring the Reg to review the patient as per the protocol and they will say 'get the SHO' to review'.* (Nurse F) (Foley & Dowling, 2019, p1187). *'Sometimes it is very hard to get a variance signed. So, patients, because of the MEWS system, now tend to, whether it is right or wrong, to have observations done maybe hourly for in a tachycardic patient, because they have an idea of what it is related to, but the Doctors aren't very keen to sign a variance'.* (Staff Nurse 3, line 39) (Greaves, 2017, p145). *'but they would always run it by the doctor but it's always very verbally, there's never really much written in their notes, like, the doctor wouldn't really write in their notes, 'staff nurse informed; patient's Mews 3; went and assessed patient; or this is what I have suggested', or whatever, it's always very verbal'.* (Surgical ward sister 01[19]) (Mc Gaughey, 2013, p228).

(Continues)

TABLE 6 (Continued)

3) EWS protocol a blessing and a curse	
EWS protocol a blessing	
a. Nurse Empowerment	*'You see, with the early warning system you have got more ammunition, haven't you? You're not just taking it off your own (bat) to say, 'I'm now going, I'm not happy with the care they're receiving from you – I am going to get in touch with the anaesthetist.' You've got it down that is the protocol'.* (Staff nurse, 18 years) (Andrews and Waterman, p478). *'Yes, say look this patient is deteriorating and you can see that the MEWS score is getting higher and shove it in front of them and they [have] got to look at it, haven't they?'* (Cherry & Jones, 2015, p816). *'it 'certainly gives you a bit more bravery to pick up the phone'* (FG G6) (Elliot et al., 2015, p70). P34_RN, *EWS is an empowering tool for the nurse clinician: 'it gives you the confidence to say, 'you need to come review this patient immediately, because they're scoring a 5'.* (Flenady et al., 2020, p5 of 9). *'It is good in a way, because, to look at the patient they were laughing, talking and joking on, but because of the MEWS system, and the score the patient had, you could tell you had to refer up'.* (Staff Nurse 3 line) (Greaves, 2017, p125). *'I think it empowers the juniors because they've got a tool to say this is the guideline and this needs acting on. So, I think it's given them the confidence to do that'.* (ID: 10, RGN > 20 years) (Mc Donnell et al., 2013, p47). *'We have some standardised permitted orders. If the patient has an elevated heart rate, we can give some fluids; if they have a temperature, we can give paracetamol without having to involve the doctor. So, we can try to correct the deviation, but if it persists, we need to call the doctor. … I think, since we started using NEWS, we've started to take some actions earlier than we did before. We've become more aware; if a patient has elevated NEWS, you must do something about it. It pushes me to do a little more'* (Bente, five years of experience) (Jensen et al., 2019, p4395). *'I'll look after the patient and if it gets worse, I'll take an extra EWS, but otherwise we follow the [escalation] protocol'.* (Petersen, 2017, p5). *'I think they're very aware of somebody's observations being out of normal range. I just think when they're junior it's how empowered they feel about talking to somebody else about them'.* Senior nurse (15) (Suokas,2010, p194).
b. Supports decision making	*'Well, it's given a framework that you can say, 'Look at this.' And they actually tell you if you can actually go to who you want. But I think it's 'cause it's a framework and it makes them come'.* (Staff nurse, 28 years) (Andrews & Waterman, 2005, p478). *'I think the MEWS system is good, even if I thought, 'OK, I have the situation under control now', I would still ring the nurse practitioner. This is what I have done; they are still MEWS high at the level they were before, but they will need a look at later'.* (P02) (Dalton et al., 2018, p215). *'You do use the score to rate how sick they are and what you need to do about it'.* (Nurse G) (Foley & Dowling, 2019, p1187). *'I use it [NEWS] every day. I had a rather complicated patient a while ago. I collected vital signs, saw that the total score had increased, and summoned the doctor. The doctor was not concerned because the patient had been stable for a while. The total score had now increased; the doctor didn't find it significant, but I didn't like it and reacted. During the following night, the patient became very unstable, so the system is useful. NEWS is really good to have. It supports us. I contacted the doctor, and that was the right decision. With NEWS, I feel safer and more self-confident and have more to say to the doctor. I had a gut feeling that something was happening. I felt that I did the right thing. I felt a little stupid, but then I thought that I did the right thing'.* (Nina, five months of experience) (Jensen et al., 2019, p4392). *'When you first walk onto the floor, it (the MEWS) catches my attention…especially if you are juggling 5 or 6 patients; you can glance at the MEWS scores and if the score is elevated say, OK there is something going on here and I need to see this patient right away'.* (Stewart et al., 2014, p226). *'[Patient care is] improved as the [NEWS] makes it very clear when a patient should be reviewed and when to consider transferring a patient to high dependency'.* (Nurse 5) (Lydon et al., 2016). *'It does highlight patients that are actually deteriorating quicker than you would if you'd just got a normal TPR chart'.* (6) RGN 1–5 years' experience. (Mc Donnell et al., 2013, p46). *'..I go to someone and their observations say are sitting at a 4 and I would look and see what is making it a 4, is it change, is it something new and if I don't feel that there's action required, I'd say, 'they're pyrexic, they've a high temperature and they've a fast pulse rate and they need a couple of paracetamol and they need cultured', I would document it on the back, 'blood cultures and whatever', or, 'no action required'. So that whoever's coming behind me knows that I made that decision'.* (Senior Nurse Manager C 02 [27]) (Mc Gaughey, 2013, p222). *'When you first walk onto the floor, it (the MEWS) catches my attention…especially if you are juggling 5 or 6 patients; you can glance at the MEWS scores and if the score is elevated say, OK there is something going on here and I need to see this patient right away'.* (Stewart et al., 2014, p226).

TABLE 6 (Continued)

3) EWS protocol a blessing and a curse	
c. Protection from liability	'*I always have my evidence there to say why I want them [the outreach team] and I think because I know what they want before they come, I am able to get over to them how serious or how acute the situation is*' (CI/H) (Donohue & Endacott, 2010, p12). '*I think if you had of asked me like a year ago, I would have said no not at all. I knew when something was wrong, but I don't think I would have had the voice to say it but as you get to know groups of Doctors that really helps, and they know when you are worried that it must be something as you don't ring for everything and that has helped. I do feel more confident and also I know by doing everything that is set and by protocol that I am always backed up by that because that is the policy, and I am happy to raise concerns'*. (Staff Nurse 2, line 131) (Greaves, 2017, p141). '*Using the charts gives you a bit more confidence when you are raising causes for concern, because it is, like evidence*' (Staff Nurse 4, line 34) (Greaves, 2017, p141). '*If you don't follow the NEWS and something goes wrong then the blame rests on you and you've got nothing to back you up…whereas, once you call, you're protected'*. (Nurse 3) (Lydon et al., 2016, p691). '*We now use it on every single patient that we have on the ward and obviously they all get a score at the end of it, so I think it just rings more alarm bells if you like if a patient is unwell or is deteriorating, whereas just recording a patient's observations, you know, you might miss something'*. ((15) RGN 1–5 years' experience) (Mc Donnell et al., 2013, p46). '*Sometimes you're doing obs all the time, 'why am I doing these obs all the time?', and it takes someone to actually say, 'look this patient is quite stable, they're not acutely ill', and to make them tid or even bd, it's very rarely…I think you're scared… 'Oh what if something went wrong!' and you've been the one who has changed them to twice a day. So sometimes you could find yourself doing obs a lot when there's no need'*. (Surgical ward staff nurses 01[08]) (Mc Gaughey, 2013, p206). '*There was very much a fear aspect to begin with like, don't get me wrong [the OBS charts] were excellent and they were really good for us to be able to say, 'oh right there's something wrong [with the patient] here'. But we did take that literally, I know I took it literally to begin with because I sort of panicked, I thought right this is a legal documentation'*. (Staff nurse (26)) (Suokas, 2010, p245).
EWS protocol a curse	
d. When abnormal is normal	'*Like somebody who is on COPD, their sats 92 on room air* *that might be normal for them, isn't [it]?'* (P2). (Cherry & Jones, 2015, p816). '*Yes but sometimes you know the most saturation would be* *80 to 92. Sometimes that patient would score 2 or 3 on the* *COPD [because of the COPD]'* (P4) (Cherry & Jones, 2015, p816). '*Sometimes, you know, the renal patient, they say 'I only pee once a day', that is normal for her. Like in a renal patient. And sometimes they don't for 2, that is normal for them, but we score them 3, isn't [it]? Because she [has] not PU [passed urine]'*. (P5) (Cherry & Jones, 2015, p816). '*… she was MEWsing [had a MEWs score of] at the time 5 and 6 principally because of her resps. She was a COPD sufferer, so I wasn't overly concerned'*. (CI/H) (Donohue & Endacott, 2010, p12). '*Yeah, the main patients we find are the respiratory patients because of what is flagged up on the early warning scores. So, for example if we have a COPD patient who is on home oxygen the very fact that they are on oxygen scores them a 2 the sats in a COPD patient you want them slightly lower so that will automatically score them a 2 or a 3 so straight away when they are at their norm and what is good for them, they may be scoring a 4 or a 5. Then if you add in a slightly low blood pressure or a temperature very slightly up and before you know it, they could be scoring a 6 or a 7 which in another patient would be quite alarming but in a respiratory patient that can often be the norm for them'*. (Staff Nurse 4, line 38) (Greaves, 2010, p 144). '*Someone with COPD is not going to have a resp rate of 12 to 16, It's going to be more elevated generally, but that is normal for them. So, it's inappropriate to be phoning doctors all the time with a COPD patient who might have a resp rate of 24 when that might be perfectly normal for them. Using your clinical judgement to determine what is normal for that patient and I think parameters that are set on PAR scoring system, as well as your own judgement, are enough to be able to identify patients that are at risk'*. ((9) RGN 1–5 years) (Mc Donnell et al., 2013, p48). '*This raises one of our problems with a generic document like this because a lot of our patients have got a high respiration rate and that is their normal, you know nothing we're gonna do is gonna change that. So, although we could have someone with a respiratory rate of high twenties or low thirties, that is the patient's regular respirations and we're never gonna improve on that, so you will get a false reading from the EWS'*. (Senior nurse (31)) (Suokas, 2010, p214).

(Continues)

TABLE 6 (Continued)

EWS protocol a curse	
e. Restrictively prescriptive	*'We don't tend to use MEWS score simply because most of our patients would come out as [be identified as] needing to go to HDU [high dependency unit]'.* (CI/G) (Donohue & Endacott, 2010, p12). *'…the nurse in charge would be constantly reviewing twenty-eight patients and that's all they would do all shift, because at some time, each patient would fall into the orange section for some reason'.* (FG H2) (Elliott et al., 2015, p71). *'It will tell you that this blood pressure is low, the values are low, do you accept that or not? So, what I do is I will check the blood pressure three times to make sure, so if it's low three times I'll accept. Yes. I check usually three times, both arms'.* (Eastborough, nurse 7) (Mackintosh, 2012, p172). *'(old charts were) plotted, say blood pressure or pulse, you were able to see the trend straight off just looking at it Whenever you're looking at this (EWS chart) you're looking at colours and you're looking at what score but someone has originally come in with a blood pressure of 160 systolic and now have a blood pressure of 101 which is quite low for them but it is still the same MEWS so, you can't really see that it's different for them unless you physically look at the two numbers, you can't see the trend'* (Surgical ward staff nurses 02[07]) (Mc Gaughey, 2013, p208). *'We never have a baseline for patients when they come into the hospital. We assume that the oxygen level will be anything up to ninety-eight, ninety nine percent, but it's very seldom that with one of our chronic chest patients. […] I think we often have a tendency to over-treat patients. We are trying to get them back to the circulatory status of a thirty-year-old fit healthy person, and that's sometimes where prescriptive charts like this can fail because we don't take into account the patient'.* (Senior nurse (31)) (Suokas, 2010, p229).
f. Not fool-proof	*'I don't know for certain; I'm thinking of specific examples. If somebody is getting slowly, yes it does. And if you are dealing with maybe a junior Nurse who is not recognising that, then yes it does. But very often a senior nurse, an experienced nurse knows a patient is getting sick, knows when to call the doctor and the MEWS score is then added, sort of a red flag message for the doctor to come quickly but I can think of specific examples when it didn't; for example, a gentleman who arrested without warning whilst waiting to go home. MEWS was of no indicator benefit there and I suppose it was usually expected to warn of a sudden arrest. I am thinking of indications where a patient has had a sustained high MEWS score for a period of almost days and there was no great change in the patient's management. So, there are extremes in anomalies within the MEWS score but by and large it does help'.* (Medical ward Nurse Manager 01[02]) (Mc Gaughey, 2013, p197). *'We had a patient in [another ward] who had a EWS score of one, and a continued EWS score of one, but that patient eventually died. There was no clinical reason to have summoned attention apart from the fact that you looked at this patient and they did not look well, but there was no reason. So, it's not fool proof'.* (Senior nurse (31)) (Suokas,2010, p232).
4) Hospital Domain	
a. Hierarchical influences	*'We don't get a relationship with a senior doctor P6. Very hard to approach. Find it also hard to document. P3. It makes a difference that I am in navy blue. Being in navy blue makes a difference'.* (P5) (Cherry & Jones, 2015, p816). *'Before the [medical] registrar came there is always a running debate as things are happening about this and that…. when the registrar [arrived] it was' 'right this is what we are going to do'.* (CI/G) (Donohue & Endacott, 2010, p14). P34_RN elaborated: *'before we hit that staff alarm, if we can escalate straight to a senior doctor in ED…my experience is that 99.99% of the time, they will come immediately'.* (Flenady et al., 2020, p6 of 9). *'We had a patient who went into flash PE and the doctor was trying to handle it and probably for 45 minutes the guy was in respiratory distress and then we called the rapid response'.* (Gazarian et al., 2010, p30) *'As a first port of call if we become concerned about a patient we would go to the F1. If we felt that they were out of their depth or they weren't responding quickly enough probably the junior Nurses would go to the SHO but I would tend to go to a Registrar or a Consultant probably because I have a better relationship with them and I feel able to ring them where as other people don't'.*(Sister 1 line 51) (Greaves, 2017, p. 142). *'It would probably be your F1 because they're ward based but obviously you wouldn't undermine them, you would tell them but if you felt that maybe they weren't taking onboard then you would just bleep someone more senior'.* (Surgical ward sister 01 [19]) (Mc Gaughey, 2013, p215).

TABLE 6 (Continued)

EWS protocol a curse	
b) Staffing, workload and lack of resources	'*Ward 7: if there was just one thing, she would generally improve the ward it would be staffing. …last Saturday…she was the only permanent member of staff from that ward. There were 2 agency nurses and there was one member of staff who was familiar with the trust but wasn't familiar with the ward, so she didn't know where anything was, she wasn't able to open doors cos she didn't know codes, she wasn't able to just do simple dressings without being told where everything was…*' (Ede et al., 2020, p176). P34_RN reported: '*we don't use trends (electronic patient movement software) to estimate nursing hours whether we end up with 7 or 17 patients, we have the same amount of staffing*'. (Flenady et al., 2020, p6 of 9). '*So, a staff nurse can potentially be looking after 8 patients you can't have someone scoring a 7 that is monitoring at 15-minute observations and it is just not possible*'. (Staff Nurse 2, line 64) (Greaves,2010, p130). '*If it's busy on the ward and you have relatively healthy patients and the measurements were fine yesterday, then it's tempting to skip the measurements. … I have to prioritise. If there is no change in the patient's condition, I must prioritise other patients*'. (Bente, five years of experience) (Jensen et al., 2019, p4396). '*We are supposed to do them [the observations] once a shift. But it's whether we actually get round to doing them … if you're doing all the drugs then that's not likely to happen*' (Eastborough, nurse 5) (Mackintosh, 2012, p167). '*.. We most certainly have less staff than we would have had, we have less qualified staff and we most certainly have sicklier patients, I mean, maybe 10 or 15 years ago patients were nursed in HDU now they are nursed on a ward with constant IVs and blood transfusions and all that, you know, the same one Nurse to the whole section with her other number of patients in that section, whereas HDU or ICU you may have 1:1 nursing or even 1:2. On the ward you are 1:8 or more, in some cases 1:10. If there is no student there, no auxiliary there, the Staff Nurse is doing all of those jobs and they can't all be done at the same time to the same degree*'. (Medical ward Nurse Manager 01[02]) (Mc Gaughey, 2013, p202). '*We let the nursing supervisor know about patients who have an elevated MEWS score. It gives them (administrators) a 'just-in-time' sense of how the unit is operating, what our immediate staffing needs are, and plan for the possibility that a patient may need to be transferred to a higher level of care*'. (Stewart et al., 2014, p226). '*Oh, there are workload issues all the time. There are staffing resources …your resources are not always the best; it's a very busy high dependency ward. There was something 10, 11 IVs and a lot of those patients at 3 and 4 IVs and there are 2 central lines in there at the moment, there are 2 patients on TPN, it's very demanding*'. (Medical ward sister 02 [16]) (Mc Gaughey, 2013, p201).
c) Delayed medical response	'*Sometimes they [surgeons] are in clinics or in other hospitals and you can't always get them*'. (CI/E) (Donohue & Endacott, 2010, p13). '*2300 Patient desaturated. Called Senior House Officer (SHO), told to call ICU, ICU told to call ENT, ENT didn't answer. ITU came at request of SHO. ENT consultant called by nurse, SHO told to review. ITU and ENT disagreeing about need for trachy*'. (Ede et al., 2020, p175). '*Some doctors are better than others for reviewing immediately, others you have to chase and chase'. (Nurse D) 'You are often ringing and ringing them to come up…. The other day I spent an hour trying to get a doctor to review a patient because of their EWS*'. (Nurse G) (Foley & Dowling, 2019, p1187). '*Doctors should have been called, and initially I think the Doctor had been called, but there was a huge delay between the Doctor being called and the Doctor actually attending*'. (Staff Nurse 6, line 158) (Greaves, 2017, p138). '*If you don't get any joy from your medical staff, or you feel that their decision was inappropriate, you've got other ports of call that you can go to outreach nurses and the anaesthetics*'. (Senior nurse (15)) (Suokas, 2010, p161).
Out of hours support	'*I think the factors may be the level of Doctor and sometimes the lack of Doctors on nightshift … they are tied up with someone who is also critically unwell for a good few hours and (we) are left with a more junior down here who may be not making those decisions*'. (Staff Nurse 6, line 113) (Greaves, 2017, p138). '*.. So obviously a high score, you're going to want a doctor to see the patient; if you have a high score at night you have to go through the hospital night team and give the report to indicate the urgency by suggesting what the MEWS score is and what your interpretation is and what your anxiety is and then the hospital might push and will then refer the doctor to you urgently if it is deemed to be the case. But during the daytime you have ready access to the medical team, so you don't have to have the same clarity of thought and justification*'. (Medical ward Nurse Manager 01[02]) (Mc Gaughey, 2013, p218). '*Certainly, out of hours it's quite hard to get a decision because, I think probably rightly so, the doctors feel they don't know the patient and the full situation, and certainly, some of the more junior ones are quite worried about making a decision, which I think is quite sensible really. Sometimes there's … there was a gentleman over the weekend who became unwell, and it was difficult, the doctors were all a bit confused about which bleep they should have, and I think it's difficult to get the person you needed. So, we ended up with a medical registrar there for someone who's effectively kind of palliative care needs, and they made the decision to make them not for resuscitation. So, it wasn't their team, but it was someone more senior, and more experienced*'. (Westborough, Nurse, 5) (Mackintosh, 2012, p249).
Physical Environment.	'*[Patients' speaking up] is very important. And much more because … the type of layout that we have in hospitals now does not really allow for close monitoring of patients, so I think most of the time the patient has a lot to do with alerting the nurses, and the relatives also, when they are visiting. [From] the nurses' station now, you cannot see any patients, all you can see is the wall. Not like in the old days where you have it at the centre of the ward and it's an open ward, so that makes it easier for close monitoring. So, I think the role of the patient and the relatives is quite important*'. (Eastborough Nurse, 6) (Mackintosh, 2012, p189).

TABLE 7 GRADE-CERQual, Confidence in the individual review findings

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 1: Nurses strongly value using clinical judgement concurrently with the EWS tool.	Twelve studies (1, 4, 5, 6, 7, 8, 11, 12, 13, 15, 16, 18) Andrews & Waterman, 2005. Donohue & Endacott, 2010. Ede et al., 2020. Elliott et al., 2015. Flenady et al., 2020. Foley & Dowling, 2019. Jensen et al., 2019. Lydon et al., 2016. Mackintosh, 2012. Mc Gaughey, 2013. Petersen et al., 2017. Suokas, 2010.	*'I use my own judgement no matter what NEWS indicates. I summon the doctor when I think my patient is deteriorating, regardless of the NEWS score. Maybe other nurses summon support earlier and faster than me. I see the advantage of NEWS as a tool if you are new and have little experience, so I can see that it can be helpful, but I think, for my part, I would have made the same assessment regardless of whether I had it [NEWS] or not'. (Gunhild, nine years of experience)* (Jensen et al., 2019 *p4392).* *'In acute medicine, as I mentioned earlier, somebody's EWS score can be slightly elevated at baseline and as we get to know our patients, particularly in acute medicine the nurses can use their judgement to decide how frequently to do somebody's obs and to apply a rule, 'they must be done 6 hourly, 8 hourly, 12 hourly…', doesn't lend itself to the uniqueness of medicine … I've worked in medicine, I've worked in surgery, cardiology, theatres, ICU, I've been all over and there's different reasons for doing obs at different frequencies in all of those areas, but I think you have to allow us to interpret it to use it at its best advantage'. (Medical ward Nurse Manager 01 [02])* (Mc Gaughey, 2013, *p200).* *'Senior nurses might see a high NEWS but use clinical judgement to assess the patient and inform the intern that, even though the NEWS is high, the patient is stable'. (Nurse 4)* (Lydon et al., 2016, *p690).* *'Ward 12: …discussed the [EWS]…from his experience…patients rarely trigger on the ward, but if they do he uses his clinical judgement as well as the [EWS]to assess the situation, he states he does not solely rely on the numbers generated and looks at the individual patient's history and current management'.* (Ede et al., 2020, *p 174).* *P10_RN reports: 'there is some open hostility to the form from staff who've been around for 20–30 years. They'll tell you day in and day out that the form's a load of sh..t and takes away from clinical judgement'.* (Flenady et al., 2020, *p4 of 9).* *'I don't call a Doctor when the MEWS [score] tells me to; I'd call them when I think the patient needed it' (CIA)* (Donohue & Endacott, 2010, *p12).* *'Sometimes still you're saying, 'They're scoring 4 but that's probably quite good for her because she's back from ITU'. So again, you'd report it to the doctor, but you'd say, 'I don't think it's a particular problem.' So, you'd try and put some perspective on it, so that they're not abandoning somebody else who is quite poorly'.* *(Sister14 years)* (Andrews & Waterman, 2005, *p478).*	Minor methodological limitations No methodological limitations (1, 4, 7, 8, 15, 16, 18) Minor Methodological Limitations (5, 11, 12, 13) Moderate Limitation study (6) sample number of nurses not provided.	No or very minor concerns about coherence.	No concerns, thick data seen across studies 11, 13, 15, 18.	Highly relevant to the review question.	High Confidence Finding graded as high confidence, minor methodological limitations regarding recruitment strategies, one moderate limitation regarding unclear sample, very minor concerns regarding relevance coherence and adequacy. Rich thick data.

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 2: The EWS tool should not be used in isolation.	Six studies (7, 10, 11, 15, 17, 18) Flenady et al., 2020. Greaves, 2017. Jensen et al., 2019. Mc Gaughey, 2013. Stewart et al., 2014. Suokas, 2010.	*P22_RN 'this is a blunt tool; I know how to deal with this patient and get the help that I need when I need it.... the vital signs are the beginning of your nursing assessment really. If someone has abnormal respiratory rate, then I'm much more concerned about that than what number they're showing. If I have an asthmatic patient and their respiratory says only 24 but you can hear them wheezing and they're really tight and there's not a lot of air moving, then I'm much more concerned about that, and would escalate that much quicker'.* (Flenady et al., 2020, *p4 of p9).* *'When I use my clinical judgement or my intuition, my gut feeling, I don't only look at the measurements; I look at how the person is affected by the measurements. I consider their breathing … are they wheezing, are there any sounds? I look at and touch the patients. I have been a nurse for a while, so you learn to look at the patients in a slightly different way than just using the system'. (Marie, five years of experience)* (Jensen et al., 2019, *p4393).* *'.. you need to still be able to look at observations or even still look at your patient without having to use an Early Warning Chart to tell if your patient is unwell or not. It should be an in-hand system, but it shouldn't be a 'the' system. I think it's a combination of knowing your patient and being able to use the tool'. (Surgical ward staff nurses 02[07]) (McGaughey 2013, p199).* *'Everybody is different – we treat the patient, not the numbers'.* *'One patient may be very stable with a MEWS of 4; another patient might not do as well. You treat the individual'.* (Stewart et al., 2014, *p226).* *'It's a guideline; you're still looking at the patient, that's the one thing that everyone tends to forget. You can be working with a patient all day, and even if you did do obs once in the morning and once in the afternoon, you'll still get a better idea how well that patient is doing just by looking at them and being in contact with them'. (Senior nurse (31)) (Suokas 2010, p243).*	Minor methodological limitations No methodological limitations (7, 15) Minor Methodological limitations (10, 11, 17, 18)	Minor concerns about coherence. Consistent across six studies.	Minor concerns Thick data found in studies 7, 11, 15, 18	Relevant	Moderate confidence Finding graded as moderate confidence as thick data found in only 4 studies and the finding has moderate relevance to the review question.

(Continues)

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 3: Nurses value their knowledge, experience, and intuition in assessing risk.	Thirteen Studies (3, 4, 5, 6,8, 9, 10, 11, 13, 14, 15,16,18) Dalton et al., 2018. Donohue & Endacott, 2010. Ede et al., 2020. Elliott et al., 2015. Foley & Dowling, 2019. Gazarian et al., 2010. Greaves, 2017. Jensen et al., 2019. Mackintosh, 2012. Mc Donnell et al., 2013. Mc Gaughey, 2013. Petersen et al., 2017. Suokas, 2010.	*'I have many years under my belt within this speciality. I know when a patient is unwell and know what would happen if I don't act upon it, so I would ask the doctor to review the patient and document it' (PO1)* (Dalton et al., 2018, *p214).* *'Knowing that he was away from his baseline, at baseline he was a little vague, but just by knowing him you could tell'.* (Gazarian et al., 2010, *p29).* *'Yeah, I think to be honest the more experienced staff it is a complete insult to give them an early warning score they must follow because if you can't use your skill and knowledge base to actually look at a patient to say you're not well then I think it is a disgrace. I think at grades of staff I think people are promoted far too quickly in grades anyway and they still lack the basic experience about a few years of developing their expertise and some people will stay on one Ward for all of their career and I would challenge their expertise and their knowledge and maybe they need another system to be able to help them in their diagnosis and recognition of deterioration. So, I don't think grades come into it as such but certainly experience yes as less experienced people need a guide whereas experienced staff sometimes it is just a bit of paper which will work which they will fill in and get help anyway'. (Modern Matron 2 line 60)* (Greaves, 2017, *p163).* *'I'd like to think that it hasn't made any difference to me being able to detect my patient deteriorating' (FG I1) and 'I went to nursing school for three years—I know when it's time to ring the doctor' (FG A4) (Elliot* et al., *2015, p70).* *'That's something I've learnt was listen to your intuition. Because I found more often than not that it was telling me things that I should have been listening to anyway, so since then I think, I do listen to it, I don't just dismiss it straightaway. [I would] just keep an eye on them, keep going back to them. [..] Yeah, it's just like looking for other signs like they're not being themselves'. (Eastborough, Nurse, 5)* (Mackintosh, 2012, *p188).* *'they can also not score anything and still not be you know, there's something wrong and you can see that. And often like nurses who have experience their intuition us telling them that there's something wrong'. (3) (Mc Donnell* et al., *2012, p48).* *'(…) we [nurses] use our clinical intuition to see the patient an extra time and take an extra set of vitals, because you have some alarm bells ringing. If something just doesn't seem right, I prefer to take an extra EWS score even though nothing sticks out, because there is something you just can't define (…)'.* (Petersen et al., 2017, *p5 of 9).*	Minor methodological limitations No methodological limitations (3, 4, 8, 9, 13, 14, 15,16) Minor Methodological limitations (5 10, 11, 18) Moderate limitation study (6) sample number of nurses not provided.	Very well supported data found across studies	No concerns, Thick data found in studies (3, 8, 9, 10,11, 13, 15)	Strong relevance to review question	High Confidence Findings graded as high confidence as very minor concerns with only one moderate methodological concern regarding an unclear sample, overall, very rich data across most studies.

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 4: EWS use enhances sense of accountability and makes individual responsibilities explicit.	Seven Studies (3, 4, 10, 11, 13, 15, 18) Dalton et al., 2018. Donohue & Endacott, 2010. Greaves, 2017. Jensen et al., 2019. Mackintosh, 2012. Mc Gaughey, 2013. Suokas, 2010.	*'We are responsible for following up on what is being done or what we are going to do. It's not such a dramatic difference, really. We have always been responsible for collecting vital signs, for following up, and for paying extra attention to deteriorating patients'. (Heidi, four years of experience)* (Jensen et al., 2019, *p4393).* *'We can trace back as to who was looking after the patient so there's more accountability. You know, we can say to people well, look this person's EWS score was five and you didn't do anything about it, why is that… so yeah, they do take more responsibility'. (Senior Nurse (33)) (Suokas 2010, p156).* *'if the doctor doesn't come as soon as I'd like, it's the doctor's decision, but at the same time it's my patient and my ward and I would still feel responsible for them. If I felt strongly, I would contact someone else rather than just [accepting] 'oh I've spoken to whoever and this is the situation'. (Westborough, Nurse, 5)* (Mackintosh, 2012, *p214).* *'It can be hours before the doctors get a plan sorted between them and we are left not knowing what is going on'. (Sister 2, line 70) 'What do you want the doctor to do when you phone them about a score?' Interviewer 'I want them to take it seriously. They really should come and look. I know they have got a lot on, but when a patient suddenly scores it's their job to sort out' Sister 2 line 75* (Greaves, 2017, *p135-136).* *'If you had a patient you considered to be deteriorating in health and their MEWS score was 7 or above, but the doctor on the ward said, 'this is fine, we already know about this', what would be your action?' 'I would document I had spoken to the doctor and his/her reply; that's their decision, not mine'. (P06)* (Dalton et al., 2018, *p214).*	Minor methodological limitations No methodological limitations (3, 4, 13, 15) Very minor concerns (10,11,18)	Minor concerns regarding coherence	Minor concerns about adequacy 7 studies, 4 with rich data (10, 11, 15, 18) thin data in studies 3, 4, 13)	Moderate Relevance to review	Moderate Confidence Finding graded as moderate owing to minor concerns regarding limitations and minor concerns regarding thickness of data in some studies.

(Continues)

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 5: Persuasive Credibility of EWS.	Nine Studies (1, 5, 7, 10, 12, 13, 14,15, 17) Andrews & Waterman, 2005. Ede et al., 2020. Flenady et al., 2020. Greaves, 2017. Lydon et al., 2016. Mackintosh, 2012. Mc Donnell et al., 2013. Mc Gaughey, 2013. Stewart et al., 2014.	*'It provides what you need to get a doctor there, I think. It gives you… your full objective facts. They can't argue with a score of 5 or 6. They'll just come. It's a complete measure which they do agree to attend to, and it helps your patients more than anything, which is important'. (Staff nurse, 1 year)* (Andrews & Waterman, 2005, *p478).* *'WARD 7: …took over a patient who had only had 100mls of urine … in 11 hours, … patient was quite unwell …felt the thing that worked well…once she flagged up the problem… she had good communication between the team and the doctors acted on her concerns very quickly'.* (Ede et al., 2020, *p175).* *P14_RN commented: 'the more junior nurses say I have a 5, this is what I need to be doing'. P08_RN pointed out the usefulness of a score: 'it gives them (junior nurse clinicians) a concise idea of how sick their patient is'* (Flenady et al., 2020, *p4 of 9).* *[Extract from field notes, Westborough, FN6]* *'On a nightshift, E, the nurse in charge and I are discussing the nurses' role in escalation of care. She notes she has witnessed others being bullied, where doctors have said they have been too busy to come, often saying that there were other patients just as sick. E comments that these nurses were too descriptive in calling for help and not assertive enough. She contrasts this with her behaviour; 'I just come to the point, I'll say, Patient's drowsy, hasn't passed urine, is scoring and is clammy. If the doctors say they are too busy and can't come I'll say, Well, I'll find someone who can'. She notes one recent instance where she called the registrar and the registrar said, 'Why isn't the F1 coming to see the patient?' She explained that the F1 said she was too busy to see the patient, and the registrar said, 'Well that's fine, I'll take it up with the F1 and sort it out,' and five minutes later the F1 was on the ward'.* (Mackintosh, 2012, *p213).* *'Depending on what you tell them on the phone determines how urgent they consider it to be. It's just having the experience to know what to do with it (the score) and then following it through and getting somebody to actually look at this or come and review this patient' (4) RGN 1–5 years' experience (Mc Donnell* et al., *2012, p46).* *'MEWS is helpful if you say, 'the patient is a MEWS 4 or 5'. Physicians recognize that they need to see the patient right away'.* (Stewart et al., 2014, *p226).*	Minor methodological limitations. No methodological concerns (1,7,14, 15) Minor concerns (5, 10, 12, 13, 17)	Very minor concerns about coherence	very minor concerns, adequate rich data	minor concerns about relevance	Moderate Confidence Finding graded as moderate confidence due to minor concerns regarding methodological limitations, coherence, and relevance. However, data found was rich and adequate.

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 6: The modification of EWS parameters is complex.	Seven Studies (6, 7, 8, 10, 11, 12, 15) Elliot et al., 2015 Flenady et al., 2020 Foley & Dowling, 2019 Greaves, 2017 Jensen et al., 2019 Lydon et al., 2016 Mc Gaughey, 2013	*'getting the doctors to fill in the modification … a nightmare'. (FG I3) (Elliot* et al., *2015, p69).* *P16_RN explained: 'I've rung the doctor; they didn't do the mods (did not write modifications on the EWS chart) that they'd written on the chart (patient notes within the chart) that they would do. I could do a MET call, but they've written in the chart (patient notes) that this is their mods, nurses have to cherry-pick doctors'.* (Flenady et al., 2020, *p5 of 9).* *'SHOs do not set parameters yet they are the ones re-viewing the patient…. you ring the Reg to review the patient as per the protocol and they will say 'get the SHO' to review'. (Nurse F)* (Foley & Dowling, 2019, *p1187).* *'Sometimes it is very hard to get a variance signed. So, patients, because of the MEWS system, now tend to, whether it is right or wrong, to have observations done maybe hourly for in a tachycardic patient, because they have an idea of what it is related to, but the Doctors aren't very keen to sign a variance'. (Staff Nurse 3, line 39)* (Greaves, 2017, *p145).* *'but they would always run it by the doctor but it's always very verbally, there's never really much written in their notes, like, the doctor wouldn't really write in their notes, 'staff nurse informed; patient's Mews 3; went and assessed patient; or this is what I have suggested', or whatever, it's always very verbal'. (Surgical ward sister 01[19])* (Mc Gaughey, 2013, *p228).*	Minor methodological limitations No methodological limitations (7, 8, 15) Minor methodological limitations (10, 11, 12) Moderate limitations study (6) sample number of nurses not provided.	Minor concerns	Minor concerns, thick data in (7, 8, 10), thin data in (6, 11, 12, 15)	Very minor concerns	Moderate Confidence Finding graded as moderate, minor to moderate concerns noted with regards methodological limitations and minor concerns regards coherence adequacy and relevance.

(Continues)

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 7: Nurses communicating risk of patient deterioration to medical colleagues reflected both positive and negative experiences and influences teamwork.	Eleven Studies (1, 2, 3, 5, 7, 9, 10, 11, 13, 15, 18) Andrews & Waterman, 2005. Cherry & Jones, 2015. Dalton et al., 2018. Ede et al., 2020. Flenady et al., 2020. Gazarian et al., 2010. Greaves, 2017. Jensen et al., 2019. Mackintosh, 2012. Mc Gaughey, 2013. Suokas, 2010.	*'It's easier to act dumb and say, 'This lady in here, her breathing is very fast', rather than 'She's got a high respiration rate'. I think it can come across to them (doctors) that you don't know what you're talking about. They question everything, so you might as well just say that's what you've seen in lay terms'. (Staff nurse, 1 year)* (Andrews & Waterman, 2005, *p 477*). *'Even though you ask them, it doesn't matter just come, they are lazy'. (P1)* (Cherry & Jones, 2015, *p 816*). *'We have a mutual respect. My knowledge is ward-based, so we work well together. I can point them in the right direction, and they respect my experience. They always call the shots - their knowledge is far greater than mine'. P03* (Dalton et al., 2018, *p214*). *'I have often spoke to the doctor and said, 'this lady is really not right, but her MEWS score is 3' and the doctor just says, 'if I get time, I come and see the patient, but I have a number of things to do first'. You feel stupid sometimes if you're wasting people's time'. (P05)* (Dalton et al., 2018, *p214*). *'Ward 4: Observed interaction between doctors and nursing staff—very tense. Doctor storms off. 'I guess we'll agree to disagree'. …Would be difficult for someone not confident to escalate problems to someone who is very dismissive. When discussing patients, he is not giving eye contact and showing defensive postures'.* (Ede et al., 2020, *p176*). *'Because they knew me, and what type of nurse I was, and I knew them, we were able to trust each other'.* (Gazarian et al., 2010, *p27*). *'I sometimes think that the medical staff don't appreciate what the nurses do to look after the patients, and the MEWS is a way to get them involved'. Staff Nurse 1 line 81* (Greaves, 2017, *p171*). *'Working with other experienced nurses helps you feel more confident; you can ask questions and get some feedback and support in assessment'. (Heidi, four years of experience)* (Jensen et al., 2019, *p4395*). *'Where I came from, we used to have a registrar there, I think he's been there for many years; if I walk into the hospital on a weekend and he's on-call I'm confident. [..] But here, because you have so many doctors to deal with, it's really very difficult to … to assess their competence'. (Eastborough, Nurse, 6)* (Mackintosh, 2012, *p252*).	Minor Methodological Limitations. No methodological limitations (1, 3, 7, 9, 15), Minor methodological limitations (2, 5, 10, 11, 13, 18)	Minor Concerns	Minor Concerns, there is adequate data to support finding.	Minor concerns	Moderate Confidence Finding graded as moderate, minor concerns with regards methodological limitations mainly recruitment strategies employed and minor concerns regarding coherence adequacy and relevance.

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
		I think it's sometimes about personalities because sometimes you find that personalities of both nurses and doctors and it's just their own personality in itself, there's nothing you can do to change that, makes it difficult in some ways for them because some nurses are quite timid, and they maybe don't have the confidence and are afraid then to make that call. Whereas other nurses are confident, but they could also meet with a very confident young doctor who thinks, 'I know it all', and 'what are you calling me for?' So, you do have that and sometimes it is, and that's going to be a very hard thing when you're dealing with actual people's personalities to overcome'. (Senior Nurse Manager C 02 [27]) (Mc Gaughey, 2013, *p221).*					
Finding 8: Nurses seek continuous training/ updates on physiological terminology and physiological processes to support them in communicating and escalating patient care in response to EWS.	Seven Studies (1, 2, 6, 10, 11, 15, 18) Andrews & Waterman, 2005. Cherry & Jones, 2015. Elliot et al., 2015. Greaves, 2017. Jensen et al., 2019 Mc Gaughey, 2013 Suokas, 2010	*'One of the things I have a problem with, I suppose I don't use the proper correct language, maybe. I haven't gone any deeper into physiological training or physiological terms necessarily, and I feel that probably I don't use the right language when I'm trying to get a doctor to come and see the patient'. (Sister, 10 years)* (Andrews & Waterman, 2005, *p477).* *'Not being taught properly', P1. 'She had scored, I think, a 1 when it was really a 3', P2. 'You get some people who do not even ask if they have passed water or checked if [they have] by going back but just put a 0 anyway', P5.* (Cherry & Jones, 2015, *p816).* *'We should be educating junior staff to look for more than just teaching them to use colours' (FG A6)* (Elliott et al., 2015, *p 70)* *'Well, I had a case with a patient who came in, who actually seemed to be in pretty good shape apart from an elevated respiratory rate. Before we had learned something from NEWS, I didn't think much about the respiratory rate, but because it was elevated, I had to take new measurements in a few hours, and by then his condition had deteriorated. Then I saw that respiratory rate is often one of the first things affected when the patient is deteriorating. … I have realised that the respiratory rate is important and, if I had not used NEWS, then I might not have conducted that reassessment'. (Fiona, one year of experience)* (Jensen et al., 2019, *p4393).*	Minor Methodological limitations. No methodological limitations (1, 15) Minor limitations (2, 10, 11, 18) Moderate limitation study (6) sample number of nurses not provided.	Minor concerns.	Moderate concerns about adequacy 7 studies only. 2 studies with rich data remaining studies thin data.	Relevant to communication processes.	Moderate Confidence Finding regarded as moderate confidence, as there was minor to moderate methodological limitations in five studies. Minor to moderate concerns regarding coherence and adequacy of the data.

(Continues)

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
		'what we found was, repeatedly, that their scores weren't being done correctly, they were missing some parameters, the higher the score the more chance there was that it wasn't added up correctly and that was a frequent finding that whenever they had totted them up, they had got the wrong number and obviously that could change the response that was required. The other thing is that at all of our Crash calls we will document what the Early Warning Score was prior to the Crash call and the time and we are finding that yes, sometimes and on a regular basis the scores are low but quite often their scores aren't low, they're high, maybe 6 hours earlier but their obs haven't been repeated'. (Senior Nurse A 01[03]) (Mc Gaughey, 2013, *p205).* *'I think if you compare it to maybe two or three years ago then there is an improvement, but there is still room for [improvement]. There are still some patients that are slipping through the net, and there are still some areas where Early Warning Scores are being triggered and the appropriate action is not taking place'. (Senior nurse (15)) (Suokas, 2010, p175).*					
Finding 9: EWS use empowers nurses.	Eleven studies (1, 2, 4, 6, 7, 10, 11, 14, 16, 17,18) Andrews & Waterman, 2005. Cherry & Jones, 2015. Donohue & Endacott, 2010. Elliot et al., 2015. Flenady et al., 2020. Greaves, 2017. Jensen et al., 2019. Mc Donnell et al., 2013. Petersen et al., 2017. Stewart et al., 2014. Suokas, 2010	*'You see, with the early warning system you have got more ammunition, haven't you? You're not just taking it off your own (bat) to say, 'I'm now going, I'm not happy with the care they're receiving from you – I am going to get in touch with the anaesthetist.' You've got it down that is the protocol'. (Staff nurse, 18 years) (Andrews and Waterman, p478).* *'Yes, say look this patient is deteriorating and you can see that the MEWS score is getting higher and shove it in front of them and they [have] got to look at it, haven't they?'* (Cherry & Jones, 2015, *p816).* *'it certainly gives you a bit more bravery to pick up the phone'. (FG G6) (Elliot* et al., *2015, p70).* *P34_RN 'EWS is an empowering tool for the nurse clinician: it gives you the confidence to say, you need to come review this patient immediately, because they're scoring a 5'.* (Flenady et al., 2020, *p5 of 9).* *'I think it empowers the juniors because they've got a tool to say this is the guideline and this needs acting on. So, I think it's given them the confidence to do that'. (ID: 10, RGN > years) (Mc Donnell* et al., *2012, p47).*	Minor methodological Limitations No methodological limitations (1, 4, 7, 14, 16) Minor limitations (2, 10, 11, 17, 18) Moderate limitation in study (6), sample number of nurses not provided.	Minor concerns	Very minor concerns, lots of rich data throughout the 11 studies	Very relevant EWS protocol influences nurses in their response to patients EWS	High Confidence In spite of minor to moderate methodological limitations findings graded as high confidence because of the overall adequate rich data across the studies.

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
		'We have some standardised permitted orders. If the patient has an elevated heart rate, we can give some fluids; if they have a temperature, we can give paracetamol without having to involve the doctor. So, we can try to correct the deviation, but if it persists, we need to call the doctor. … I think, since we started using NEWS, we've started to take some actions earlier than we did before. We've become more aware; if a patient has elevated NEWS, you must do something about it. It pushes me to do a little more. ….' (Bente, five years of experience) (Jensen et al., 2019, *p4395).* *'I think they're very aware of somebody's observations being out of normal range. I just think when they're junior it's how empowered they feel about talking to somebody else about them'. Senior nurse (15) (Suokas,2010, p194)*					
Finding 10: The EWS helps nurses to prioritise patients most at risk and supports their decision-making processes.	Nine Studies (1, 3, 8, 11, 12, 14, 15, 17, 18) Andrews & Waterman, 2005. Dalton et al., 2018 Foley & Dowling, 2019. Jensen et al., 2019. Lydon et al., 2016. Mc Donnell et al., 2013. Mc Gaughey, 2013. Stewart et al., 2014. Suokas, 2010.	*'Well, it's given a framework that you can say, 'Look at this.' And they actually tell you if you can actually go to who you want. But I think it's 'cause it's a framework and it makes them come'. (Staff nurse, 28 years)* (Andrews & Waterman, 2005, *p478).* *'I think the MEWS system is good, even if I Thought', 'OK, I have the situation under control Now', I would still ring the nurse practitioner. This is what I have done; they are still MEWS high at the level they were before, but they will need a look at later'. P02* (Dalton et al., 2018, *p215).* *'You do use the score to rate how sick they are and what you need to do about it'. (Nurse G)* (Foley & Dowling, 2019, *p1187).* *'I use it [NEWS] every day. I had a rather complicated patient a while ago. I collected vital signs, saw that the total score had increased, and summoned the doctor. The doctor was not concerned because the patient had been stable for a while. The total score had now increased; the doctor didn't find it significant, but I didn't like it and reacted. During the following night, the patient became very unstable, so the system is useful. NEWS is really good to have. It supports us. I contacted the doctor, and that was the right decision. With NEWS, I feel safer and more self-confident and have more to say to the doctor. I had a gut feeling that something was happening. I felt that I did the right thing. I felt a little stupid, but then I thought that I did the right thing'. (Nina, five months of experience)* (Jensen et al., 2019, *p4392).*	Minor Methodological limitations No methodological limitations (1,3,8, 14,15) Minor limitations (11, 12, 17, 18)	Minor concerns about coherence	No or very minor concerns about adequacy lots of rich data especially studies (1,8, 11, 15,18)	Minor concerns about relevance	High Confidence Finding graded as high confidence as there was only minor methodological limitations and very minor concerns regarding coherence, adequacy, and relevance.

(Continues)

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
		'When you first walk onto the floor, it (the MEWS) catches my attention…especially if you are juggling 5 or 6 patients; you can glance at the MEWS scores and if the score is elevated say, OK there is something going on here and I need to see this patient right away'. (Stewart et al., 2014, *p226).* *'[Patient care is] improved as the [NEWS] makes it very clear when a patient should be reviewed and when to consider transferring a patient to high dependency'. (Nurse 5)* (Lydon et al., 2016*).* *'It does highlight patients that are actually deteriorating quicker than you would if you'd just got a normal TPR chart'. (6) RGN 1–5 years' experience. (Mc Donnell* et al., *2012, p46).* *'..I go to someone and their observations say are sitting at a 4 and I would look and see what is making it a 4, is it change, is it something new and if I don't feel that there's action required, I'd say, 'they're pyrexic, they've a high temperature and they've a fast pulse rate and they need a couple of paracetamol and they need cultured', I would document it on the back, 'blood cultures and whatever', or, 'no action required'. So that whoever's coming behind me knows that I made that decision'. (Senior Nurse Manager C 02 [27])* (Mc Gaughey, 2013, *p222).* *'When you first walk onto the floor, it (the MEWS) catches my attention…especially if you are juggling 5 or 6 patients; you can glance at the MEWS scores and if the score is elevated say, OK there is something going on here and I need to see this patient right away'.* (Stewart et al., 2014, *p226).*					

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 11: EWS acts as a form of evidence and can protect nurses from liability.	Six Studies (4, 10, 12, 13, 14, 18) Donohue & Endacott, 2010. Greaves, 2017. Lydon et al., 2016. Mackintosh, 2012. Mc Donnell et al., 2013. Suokas, 2010.	*'I always have my evidence there to say why I want them [the outreach team] and I think because I know what they want before they come, I am able to get over to them how serious or how acute the situation is' (CI/H)* (Donohue & Endacott, 2010, *p12).* *'I think if you had of asked me like a year ago, I would have said no not at all. I knew when something was wrong, but I don't think I would have had the voice to say it but as you get to know groups of Doctors that really helps, and they know when you are worried that it must be something as you don't ring for everything and that has helped. I do feel more confident and also I know by doing everything that is set and by protocol that I am always backed up by that because that is the policy, and I am happy to raise concerns'. (Staff Nurse 2, line 131)* (Greaves, 2017, *p141).* *'Using the charts gives you a bit more confidence when you are raising causes for concern, because it is, like evidence' (Staff Nurse 4, line 34)* (Greaves, 2017, *p141).* *'If you don't follow the NEWS and something goes wrong then the blame rests on you and you've got nothing to back you up… whereas, once you call, you're protected'. (Nurse 3)* (Lydon et al., 2016, *p691).* *'We now use it on every single patient that we have on the ward and obviously they all get a score at the end of it, so I think it just rings more alarm bells if you like if a patient is unwell or is deteriorating, whereas just recording a patient's observations, you know, you might miss something (15) RGN 1–5 years' experience'.* *(Mc Donnell* et al., *2012, p46).* *'Sometimes you're doing obs all the time, 'why am I doing these obs all the time?', and it takes someone to actually say, 'look this patient is quite stable, they're not acutely ill', and to make them tid or even bd, it's very rarely…I think you're scared…'Oh what if something went wrong!' and you've been the one who has changed them to twice a day. So sometimes you could find yourself doing obs a lot when there's no need'. (Surgical ward staff nurses 01[08])* (Mc Gaughey, 2013, *p206).* *'There was very much a fear aspect to begin with like, don't get me wrong [the OBS charts] were excellent and they were really good for us to be able to say, 'oh right there's something wrong [with the patient] here'. But we did take that literally, I know I took it literally to begin with because I sort of panicked, I thought right this is a legal documentation'. (Staff nurse (26)) (Suokas, 2010, p245).*	Minor Methodological limitations No methodological limitations (4, 13, 14) Minor limitations (10, 12, 18)	Minor concerns about coherence	Moderate concerns about adequacy, six studies only.	No or minor concerns about relevance	Moderate Confidence Finding graded as moderate because of minor methodological limitations and moderate concerns about adequacy of the data.

(Continues)

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 12: Nurses reflected how patients with chronic conditions like COPD have different EWS baseline values and that EWS is a generic document solely designed with a young fit healthy person in mind.	Six Studies (2, 4, 10, 13, 14, 18) Cherry & Jones, 2015. Donohue & Endacott, 2010. Greaves, 2017; Mackintosh, 2012 Mc Donnell et al., 2013 Soukas, 2010.	*'Like somebody who has COPD, their sats 92 on room air, that might be normal for them. Isn't it?' (P2).* (Cherry & Jones, 2015, *p816).* *'Yes, but sometimes the saturations would be 80 to 92. Sometimes that patient would score 2 or 3 on the MEWS (because of the COPD]' (P4)* (Cherry & Jones, 2015, *p816).* *'… she was MEWsing [had a MEWs score of] at the time 5 and 6 principally because of her resps. She was a COPD sufferer, so I wasn't overly concerned'. (CI/H)* (Donohue & Endacott, 2010, *p12).* *'Yeah, the main patients we find are the respiratory patients because of what is flagged up on the early warning scores. So, for example if we have a COPD patient who is on home oxygen the very fact that they are on oxygen scores them a 2 the sats in a COPD patient you want them slightly lower so that will automatically score them a 2 or a 3 so straight away when they are at their norm and what is good for them, they may be scoring a 4 or a 5. Then if you add in a slightly low blood pressure or a temperature very slightly up and before you know it, they could be scoring a 6 or a 7 which in another patient would be quite alarming but in a respiratory patient that can often be the norm for them'. (Staff Nurse 4, line 38) (Greaves, 2010, p 144).* *'Someone with COPD is not going to have a resp rate of 12 to 16, It's going to be more elevated generally, but that is normal for them. So, it's inappropriate to be phoning doctors all the time with a COPD patient who might have a resp rate of 24 when that might be perfectly normal for them. Using your clinical judgement to determine what is normal for that patient and I think parameters that are set on PAR scoring system, as well as your own judgement, are enough to be able to identify patients that are at risk'. ((9) RGN 1–5 years) (Mc Donnell* et al., *2012, p48).* *'This raises one of our problems with a generic document like this because a lot of our patients have got a high respiration rate and that is their normal, you know nothing we're gonna do is gonna change that. So, although we could have someone with a respiratory rate of high twenties or low thirties, that is the patient's regular respirations and we're never gonna improve on that, so you will get a false reading from the EWS'. (Senior nurse (31)) (Suokas, 2010, p214).*	Minor methodological limitations No methodological limitations (4, 13, 14) Minor limitations (2, 10, 18)	Minor concerns with coherence	Moderate concerns regarding adequacy. Only Six studies, however rich data found in studies.	Very relevant to review question	Moderate Confidence Finding graded as moderate confidence, due to concerns regarding adequacy of data, minor methodological limitations, and minor concerns regarding coherence.

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 13: EWS should not be considered a fool-proof document, care needs to be taken as there can be anomalies with the chart.	Four Studies (10, 13, 15, 18) Greaves, 2017. Mackintosh, 2012. Mc Gaughey, 2013. Suokas, 2010.	*'…I can think of specific examples when it didn't; for example, a gentleman who arrested without warning whilst waiting to go home. MEWS was of no indicator benefit there and I suppose it was usually expected to warn of a sudden arrest. I am thinking of indications where a patient has had a sustained high MEWS score for a period of almost days and there was no great change in the patient's management. So, there are extremes in anomalies within the MEWS score but by and large it does help'. (Medical ward Nurse Manager 01[02])* (Mc Gaughey, 2013, *p197).* *'We had a patient in [another ward] who had a EWS score of one, and a continued EWS score of one, but that patient eventually died. There was no clinical reason to have summoned attention apart from the fact that you looked at this patient and they did not look well, but there was no reason. So, it's not fool proof'. (Senior nurse (31)) (Suokas,2010, p232).*	Minor Methodological concerns No methodological limitations (13, 15) Minor methodological limitations (10, 18)	Moderate concerns	Moderate concerns about adequacy, limited data	Moderate concerns regarding relevance to the review question	Low confidence Finding graded as low, due to moderate concerns regarding coherence, data adequacy and relevance to review question. Two papers contained rich data 15, 18, whilst the other two papers data was moderately thin.
Finding 14: Positions of seniority in nursing instil confidence in escalating care and escalating care to a more senior level was favoured.	Seven studies (2, 4, 5, 7, 9, 10, 15) Cherry & Jones, 2015. Donohue & Endacott, 2010. Ede et al., 2020. Flenady et al., 2020. Gazarian et al., 2010. Greaves, 2017. Mc Gaughey, 2013.	*'It makes a difference that I am in navy blue. Being in navy blue makes a difference'. (P5)* (Cherry & Jones, 2015, *p816).* *'Before the [medical] registrar came there is always a running debate as things are happening about this and that…. when the registrar [arrived] it was 'right this is what we are going to do'. (CI/G)* (Donohue & Endacott, 2010, *p14).* *P34_RN elaborated: 'before we hit that staff alarm, if we can escalate straight to a senior doctor in ED…my experience is that 99.99% of the time, they will come immediately'.* (Flenady et al., 2020, *p6 of 9).* *'We had a patient who went into flash PE and the doctor was trying to handle it and probably for 45 minutes the guy was in respiratory distress and then we called the rapid response'.* (Gazarian et al., 2010, *p30)* *'As a first port of call if we become concerned about a patient, we would go to the F1. If we felt that they were out of their depth or they weren't responding quickly enough probably the junior nurses would go to the SHO, but I would tend to go to a Registrar or a Consultant probably because I have a better relationship with them and I feel able to ring them where as other people don't'. (Sister 1, line 51)* (Greaves, 2017, *p142).*	Minor Methodological limitations No methodological limitations (4, 7, 9, 15) Minor methodological limitations (2, 5, 10)	Minor concerns regarding coherence.	Minor concerns regarding adequacy.	Very minor concerns about relevance	Moderate Confidence Finding graded as moderate confidence. Minor methodological concerns and minor concerns with coherence and adequacy, very minor concerns regarding relevance.

(Continues)

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
		'It would probably be your F1 because they're ward based but obviously you wouldn't undermine them, you would tell them but if you felt that maybe they weren't taking onboard then you would just bleep someone more senior'. (Surgical ward sister 01 [19]) (Mc Gaughey, 2013, *p215*).					
Finding 15: Challenges when trying to escalate care in response to EWS.	Five studies (4, 5, 8, 10, 18) Donohue & Endacott, 2010. Ede et al., 2020. Foley & Dowling, 2019 Greaves, 2017. Soukas, 2010.	*'Sometimes they [surgeons] are in clinics or in other hospitals and you can't always get them'. (CI/E)* (Donohue & Endacott, 2010, *p13*). *'2300 Patient desaturated. Called Senior House Officer (SHO), told to call ICU, ICU told to call ENT, ENT didn't answer. ITU came at request of SHO. ENT consultant called by nurse, SHO told to review. ITU and ENT disagreeing about need for trachy'.* (Ede et al., 2020, *p175*). *'Doctors should have been called, and initially I think the Doctor had been called, but there was a huge delay between the Doctor being called and the Doctor actually attending'. (Staff Nurse 6, line 158)* (Greaves, 2017, *p138*). *'Some doctors are better than others for reviewing immediately, others you have to chase and chase'. (Nurse D)* (Foley & Dowling, 2019, *p1187*). *'You are often ringing and ringing them to come up…. The other day I spent an hour trying to get a doctor to review a patient because of their EWS'. (Nurse G)* (Foley & Dowling, 2019, *p1187*). *'If you don't get any joy from your medical staff, or you feel that their decision was inappropriate, you've got other ports of call that you can go to outreach nurses and the anaesthetics'. (Senior nurse (15)) (Suokas, 2010, p161).*	Minor Methodological limitations No methodological limitations (4, 8) Minor methodological limitations (5, 10,18)	Minor concerns	Minor concerns on adequacy of data only 5 studies.	Very relevant to review question	Moderate confidence Findings graded as moderate, as despite there only being 5 studies data was strong and there were only minor concerns regarding coherence and methodological limitations.
Finding 16: Challenges for nurses in adhering to EWS escalation protocols due to reduced staffing levels, higher levels of patient acuity and lack of resources.	Eight studies (5,7,10,11,13,15,17,18) Ede et al., 2020. Flenady et al., 2020. Greaves, 2017. Jensen et al., 2019. Mackintosh, 2012. Mc Gaughey, 2013. Stewart et al., 2014. Suokas, 2010.	*'Ward 7: if there was just one thing, she would generally improve the ward it would be staffing. …last Saturday…she was the only permanent member of staff from that ward. There were 2 agency nurses and there was one member of staff who was familiar with the trust but wasn't familiar with the ward, so she didn't know where anything was, she wasn't able to open doors cos she didn't know codes, she wasn't able to just do simple dressings without being told where everything was…'* (Ede et al., 2020, *p176*). *P34_RN reported: 'we don't use trends (electronic patient movement software) to estimate nursing hours whether we end up with 7 or 17 patients, we have the same amount of staffing'.* (Flenady et al., 2020, *p6 of 9*).	Minor methodological limitations No methodological limitations (7, 13,15) Minor methodological limitations (5, 10, 11, 17,18)	No or very minor concerns about coherence	Minor concerns around adequacy, well supported data in 8 studies	High relevance to review question.	High Confidence Finding graded as high confidence very minor concerns regarding methodological limitations, coherence, and adequacy. Finding well supported by data.

TABLE 7 (Continued)

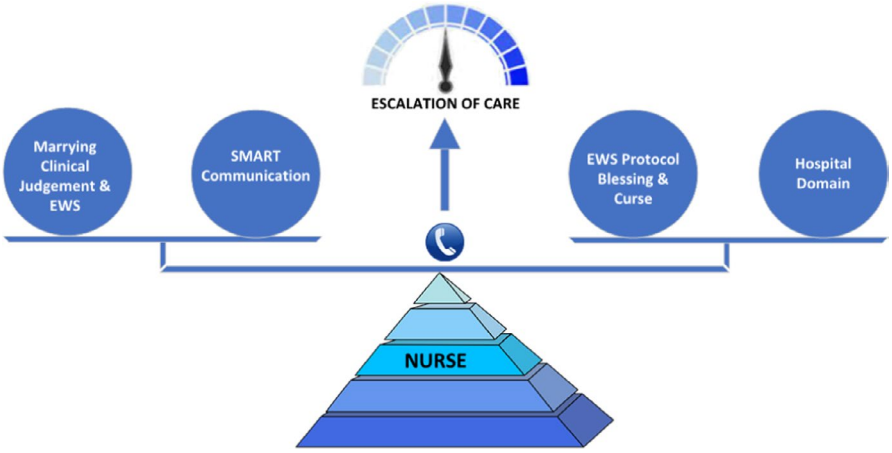
Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
		'.. We most certainly have less staff than we would have had, we have less qualified staff and we most certainly have sicklier patients, I mean, maybe 10 or 15 years ago patients were nursed in HDU now they are nursed on a ward with constant IVs and blood transfusions and all that, you know, the same one Nurse to the whole section with her other number of patients in that section, whereas HDU or ICU you may have 1:1 nursing or even 1:2. On the ward you are 1:8 or more, in some cases 1:10 If there is no student there, no auxiliary there, the Staff Nurse is doing all of those jobs and they can't all be done at the same time to the same degree'. (Medical ward Nurse Manager 01[02]) (Mc Gaughey, 2013, *p202*). *'So, a staff nurse can potentially be looking after 8 patients you can't have someone scoring a 7 that is monitoring at 15-minute observations and it is just not possible'. (Staff Nurse 2, line 64) (Greaves,2010, p130).* *'If it's busy on the ward and you have relatively healthy patients and the measurements were fine yesterday, then it's tempting to skip the measurements. … I have to prioritise. If there is no change in the patient's condition, I must prioritise other patients'. (Bente, five years of experience)* (Jensen et al., 2019, *p4396*). *'We are supposed to do them [the observations] once a shift. But it's whether we actually get around to doing them…if you're doing all the drugs then that's not likely to happen'. (Eastborough, nurse 5)* (Mackintosh, 2012, *p167*). *'We let the nursing supervisor know about patients who have an elevated MEWS score. It gives them (administrators) a 'just-in-time' sense of how the unit is operating, what our immediate staffing needs are, and plan for the possibility that a patient may need to be transferred to a higher level of care'.* (Stewart et al., 2014, *p226*). *'Oh, there are workload issues all the time. There are staffing resources …your resources are not always the best; it's a very busy high dependency ward. There was something 10, 11 IVs and a lot of those patients at 3 and 4 IVs and there are 2 central lines in there at the moment, there are 2 patients on TPN, it's very demanding'. (Medical ward sister 02 [16])* (Mc Gaughey, 2013, *p201*).					

(Continues)

TABLE 7 (Continued)

Summary of review finding	Studies contributing to the review finding	Examples of Supporting Quotes	Methodological Limitations	Coherence	Adequacy of data	Relevance	Explanation of CERQual assessment
Finding 17: Nurses felt out of hours escalation of care in response to EWS could benefit from the availability of more senior medical decision makers.	Three Studies (10, 13, 15) Greaves, 2017. Mackintosh, 2012. Mc Gaughey, 2013.	*'I think the factors may be the level of Doctor and sometimes the lack of Doctors on nightshift … they are tied up with someone who is also critically unwell for a good few hours and (we) are left with a more junior down here who may be not making those decisions' (Staff Nurse 6, line 113)* (Greaves, 2017, *p138).* *'.. So obviously a high score, you're going to want a doctor to see the patient; if you have a high score at night you have to go through the hospital night team and give the report to indicate the urgency by suggesting what the MEWS score is and what your interpretation is and what your anxiety is and then the hospital might push and will then refer the doctor to you urgently if it is deemed to be the case. But during the daytime you have ready access to the medical team, so you don't have to have the same clarity of thought and justification'. (Medical ward Nurse Manager 01[02])* (Mc Gaughey, 2013, *p218).* *'Certainly, out of hours it's quite hard to get a decision because, I think probably rightly so, the doctors feel they don't know the patient and the full situation, and certainly, some of the more junior ones are quite worried about making a decision, which I think is quite sensible really. Sometimes there's … there was a gentleman over the weekend who became unwell, and it was difficult, the doctors were all a bit confused about which bleep they should have, and I think it's difficult to get the person you needed. So, we ended up with a medical registrar there for someone who's effectively kind of palliative care needs, and they made the decision to make them not for resuscitation. So, it wasn't their team, but it was someone more senior, and more experienced'. (Westborough, Nurse, 5)* (Mackintosh, 2012, *p249).*	Minor Methodological limitations No methodological limitations (13, 15) Minor methodological limitations (10)	Minor concerns about coherence	Moderate concerns about adequacy only 3 studies with rich data	Relevant to the review question as influences and impacts on nurses in responding to EWS.	Low confidence Finding graded as low confidence because although there were only minor concerns regarding methodological limitations and coherence. The adequacy of the data was lacking only 3 studies (2 qual and one multiple case study approach)
Finding 18: The modern hospital layout can influence nurses in their escalation of care. The patient and their family's role in escalating care was highlighted	One study (13) Mackintosh, 2012.	*'[Patients' speaking up] is very important. And much more because … the type of layout that we have in hospitals now does not really allow for close monitoring of patients, so I think most of the time the patient has a lot to do with alerting the nurses, and the relatives also, when they are visiting. [From] the nurses' station now, you cannot see any patients, all you can see is the wall. Not like in the old days where you have it at the centre of the ward and it's an open ward, so that makes it easier for close monitoring. So, I think the role of the patient and the relatives is quite important'. (Eastborough Nurse, 6)* (Mackintosh, 2012, *p189).*	Minor methodological limitations Minor methodological limitations	Minor concerns about coherence	Major concerns about adequacy due to only 1 study.	Very relevant to review question on the factors that influence nurses when escalating care in response to EWS.	Low confidence Finding graded as low because major concerns regarding data adequacy, only one study.

FIGURE 3 Conceptual Model



3.2 | Theme 2: SMART Communication

The theme of SMART (Specific, Measurable, Achievable, Relevant/Realistic and Timely) communication emerged from exploring nurses' experiences of using the EWS to communicate and escalate patient care episodes. The acronym SMART was first used in 1981 by Doran who developed it towards setting effective measurable goals (Revello & Fields, 2015). This review demonstrated that nurses' experiences of communicating EWS not only revealed alignment to the SMART acronym but also reflected their need for this SMART focus in other areas of communication as well.

3.2.1 | Finding 5: Persuasive Credibility of EWS

Nurses in nine studies identified that EWS provides them with a specific formula that prompts a response (Andrews & Waterman, 2005; Ede et al., 2020; Flenady et al., 2020; Greaves, 2017; Lydon et al., 2015; Mackintosh, 2012; McDonnell et al., 2013; Mc Gaughey, 2013; Stewart et al., 2014). Three of these studies saw nurses describe EWS as a measurable numerical language, concise and precise for staff (Flenady et al., 2020; Greaves, 2017; McDonnell et al., 2013). Nurses in two of the studies recognised how the EWS allows staff who are unfamiliar with each other to escalate care and communicate patient deterioration thereby achieving its aim (Mackintosh, 2012; Mc Gaughey, 2013). EWS was seen as a familiar tool, common across hospital settings making it relevant (Greaves, 2017). EWS ability to demand and convey a sense of urgency whilst securing a timely response was reflected in five studies (Andrews & Waterman, 2005; Ede et al., 2020; Lydon et al., 2015; McDonnell et al., 2013; Stewart et al., 2014). The EWS as a SMART form of communication was evident.

> *'It provides what you need to get a doctor there, I think. It gives you…your full objective facts. They can't argue with a score of 5 or 6. They'll just come. It's a complete measure which they do agree to attend to, and it helps your patients more than anything, which is important'. (Staff nurse, 1 year)* (Andrews and Waterman 2005, *p. 478).*

3.2.2 | Finding 6: The modification of EWS parameters is complex

Seven studies saw nurses remark that doctors are reluctant to deviate away from the set parameters laid out in the tool and getting these adjustments documented is time consuming, frustrating and instigated in the main by nurses (Elliott et al., 2015; Flenady et al., 2020; Foley & Dowling, 2019; Greaves, 2017; Jensen et al., 2019; Lydon et al., 2015; Mc Gaughey, 2013).

> 'getting the doctors to fill in the modification … a nightmare' (FG I3) (Elliott et al., 2015, p. 69).

3.2.3 | Finding 7: Nurses communicating risk of patient deterioration to medical colleagues reflected both positive and negative experiences and influences teamwork

The ease of escalating care using EWS when there is mutual respect, trust and support amongst colleagues was referred to in five studies (Dalton et al., 2018; Flenady et al., 2020; Gazarian et al., 2010; Jensen et al., 2019; Mackintosh, 2012). Similarly, five studies suggest that tensions between the doctor and nurse, and their personalities can make escalation of care difficult (Cherry & Jones, 2015; Ede et al., 2020; Flenady et al., 2020; Mc Gaughey, 2013; Suokas, 2010).

> *'Ward 4: Observed interaction between doctors and nursing staff – very tense. Doctor storms off. I guess we'll agree to disagree. …Would be difficult for someone not confident to escalate problems to someone who is very dismissive'* (Ede et al., 2020, *p176).*

Nevertheless, EWS ability to encourage teamwork by connecting the nurse and doctor and jointly involving them in patients' plan of care was recognised (Greaves, 2017).

> *'I sometimes think that the medical staff don't appreciate what the nurses do to look after the patients, and the MEWS is a way to get them involved' (Staff Nurse 1, line 81)* (Greaves 2017, *p171).*

3.2.4 | Finding 8: Nurses seek continuous training/updates on physiological terminology and physiological processes to support them in communicating and escalating patient care in response to EWS

Nurses verbalised the importance of measuring respirations correctly and viewed respirations as the first indicator of patient deterioration following EWS training (Andrews & Waterman, 2005; Jensen et al., 2019; Suokas, 2010). The need for continuous effectual EWS training was remarked on in seven studies (Andrews & Waterman, 2005; Cherry & Jones, 2015; Elliott et al., 2015; Greaves, 2017; Jensen et al., 2019; Mc Gaughey, 2013; Suokas, 2010).

> *'I suppose I don't use the proper correct language maybe. I haven't gone any deeper into physiological training or physiological terms necessarily…' (Sister, 10 years)* (Andrews and Waterman 2005, *p. 477).*

Nurses' fear of being judged by colleagues if using medical terms in the wrong context when escalating care was reflected in two studies (Andrews & Waterman, 2005; Dalton et al., 2018).

> *'I feel that probably I don't use the right language when I'm trying to get a doctor to come and see the patient' (Sister, 10 years)* (Andrews & Waterman, 2005, *p. 477).*

3.3 | Theme 3: EWS Protocol—A Blessing and a Curse

EWS protocol could be construed as a double-edged sword with both favourable and unfavourable consequences for nurses.

3.4 | EWS Protocol—A Blessing

3.4.1 | Finding 9: EWS use empowers nurses

Nurse's sense of empowerment and enablement was reflected in eleven papers. Nurses appreciated the strength of the EWS tool and its ability to assist them in arguing for escalation of care (Andrews & Waterman, 2005; Cherry & Jones, 2015; Donohue & Endacott, 2010; Elliott et al., 2015; Flenady et al., 2020; Greaves, 2017; Jensen et al., 2019; McDonnell et al., 2013; Petersen et al., 2017; Stewart et al., 2014; Suokas, 2010).

> *'…it gives you the confidence to say, you need to come review this patient immediately, because they're scoring a 5' (P34, RN)* (Flenady et al., 2020, *p.5 of 9).*

3.4.2 | Finding 10: The EWS helps nurses to prioritise patients most at risk and supports their decision-making processes

Nine studies saw nurses describe how EWS protocols helps to validate, strengthen and prioritise patient care (Andrews & Waterman, 2005; Dalton et al., 2018; Foley & Dowling, 2019; Jensen et al., 2019; Lydon et al., 2016; McDonnell et al., 2013; Mc Gaughey, 2013; Stewart et al., 2014; Suokas, 2010).

> *'You do use the score to rate how sick they are and what you need to do about it' (Nurse G)* (Foley & Dowling, 2019, *p. 1187).*

3.4.3 | Finding 11: EWS acts as a form of evidence and can protect nurses from liability

Six studies remarked on the legality of the EWS document and how it offers nurses' protection from liability (Donohue & Endacott, 2010; Greaves, 2017; Lydon et al., 2016; Mackintosh, 2012; McDonnell et al., 2013; Suokas, 2010).

> *'If you don't follow the NEWS and something goes wrong then the blame rests on you and you've got nothing to back you up…whereas, once you call, you're protected' (Nurse 3) (Lydon et al., 2016, p. 691).*

3.5 | EWS Protocol—A Curse

The unfavourable consequences of using the EWS tool and related protocols, that is the curse aspect of it was also evident in many of the studies. The tool was felt to be narrow and restrictively prescriptive due to its specificity and sensitivity (Donohue & Endacott, 2010; Elliott et al., 2015). For patients with chronic conditions whose 'normal' values reflected a deviation away from the parameters as outlined in the EWS tool, this was particularly problematic and burdensome for nurses.

3.5.1 | Finding 12: Nurses reflected how patients with chronic conditions like COPD have different EWS baseline values and that EWS is a generic document solely designed with a young fit healthy person in mind

Six studies reflected this finding (Cherry & Jones, 2015; Donohue & Endacott, 2010; Greaves, 2017; Mackintosh, 2012; McDonnell et al., 2013; Suokas 2010).

> *'Someone with COPD is not going to have a resp rate of 12 to 16, It's going to be more elevated generally, but that is normal for them. So, it's inappropriate to be phoning doctors all the time…' ((9) RGN 1-5 years) (*McDonnell et al. 2013, *p48).*

3.5.2 | Finding 13: EWS should not be considered a fool-proof document, care needs to be taken as there can be anomalies with the chart

Four studies described episodes where the EWS chart did not function as expected (Greaves, 2017; Mackintosh, 2012; Mc Gaughey, 2013; Suokas, 2010). Two of these studies revealed scenarios where one patient had a cardiac arrest and one patient had died. In both these cases, the EWS had failed to signal patient deterioration, suggesting EWS tools are not infallible and there can be inconsistencies with the score (Mc Gaughey, 2013; Suokas, 2010).

> *'We had a patient in [another ward] who had a EWS score of one, and a continued EWS score of one, but that patient eventually died. There was no clinical reason to have summoned attention apart from the fact that you looked at this patient and they did not look well, but there was no reason. So, it's not fool proof' (Senior nurse (31)) (*Suokas, 2010, *p232).*

3.6 | Theme 4: Hospital Domain

This theme emerged from nurses' experiences of the in-house day-to-day workings of the hospital and how this impacted their escalation of care in response to EWS.

3.6.1 | Finding 14: Positions of seniority in nursing instil confidence in escalating care and escalating care to a higher level was favoured

Senior nurses in three studies reflected on how their nursing position gave them confidence to escalate care to a higher level (Cherry & Jones, 2015; Greaves, 2017; Mc Gaughey, 2013). The positive impact of escalating to a higher level in terms of patient outcomes was iterated in seven studies (Cherry & Jones, 2015; Donohue & Endacott, 2010; Ede et al., 2020; Flenady et al., 2020; Gazarian et al., 2010; Greaves, 2017; Mc Gaughey, 2013).

> *'As a first port of call if we become concerned about a patient we would go to the F1. If we felt that they were out of their depth or they weren't responding quickly enough probably the junior Nurses would go to the SHO, but I would tend to go to a Registrar or a Consultant probably because I have a better relationship with them and I feel able to ring them whereas other people don't' (Sister 1 line 51) (*Greaves 2017, *p. 142).*

3.6.2 | Finding 15: Challenges when trying to escalate care in response to EWS

Nurses in five studies commented on their frustration when escalating care, be it in accessing a doctor on the phone or in them attending to review the patient (Donohue & Endacott, 2010; Ede et al., 2020; Foley & Dowling, 2019; Greaves, 2017; Suokas, 2010).

> *'You are often ringing and ringing them to come up…. The other day I spent an hour trying to get a doctor to review a patient because of their EWS' (Nurse G) (Foley & Dowling, 2019, p. 1187).*

3.6.3 | Finding 16: Challenges for nurses in adhering to EWS escalation protocols due to reduced staffing levels, higher levels of patient acuity and lack of resources

Nurses described diminished staffing levels, unrealistic workloads and sicker patients as obstacles in the escalation of care in response to EWS in seven papers (Flenady et al., 2020; Greaves, 2017; Jensen et al., 2019; Mackintosh, 2012; Mc Gaughey, 2013; Stewart et al., 2014; Suokas, 2010).

> *'So, a Staff Nurse can potentially be looking after 8 patients you can't have someone scoring a 7 that is monitoring at 15-minute observations and it is just not possible' (Staff Nurse 2, line 64) (*Greaves 2017, *p. 130).*

3.6.4 | Finding 17: Nurses felt out of hours escalation of care in response to EWS could benefit from the availability of more senior medical decision makers

A link between out-of-hours medical support and decision making was revealed. Nurses in three studies remarked on how reduced numbers of senior doctors on nights and weekends makes escalation

of care more complicated (Greaves, 2017; Mackintosh, 2012; Mc Gaughey, 2013).

> *'I think the factors may be the level of Doctor and sometimes the lack of Doctors on nightshift … they are tied up with someone who is also critically unwell for a good few hours and we are left with a more junior down here who is maybe not making those decisions' (Staff Nurse 6, line 113) (*Greaves 2017, *p.138).*

3.6.5 | Finding 18: The modern hospital layout can influence nurses in their escalation of care. The patient and their family's role in escalating care was highlighted

One study illustrated the possible role of the patient themselves and family in escalation of care (Mackintosh, 2012).

> *'… the type of layout that we have in hospitals now does not really allow for close monitoring of patients, so I think most of the time the patient has a lot to do with alerting the nurses, and the relatives also…' (Eastborough, Nurse, 6) (*Mackintosh 2012, *p. 189).*

4 | DISCUSSION

This QES demonstrates that EWS tools are used and valued by nurses though there are challenges and frustrations in adhering to the protocols, and these can be compounded by complex hospital domain issues. Whilst EWS may be perceived as a unidimensional scoring tool, it requires a multidimensional approach including consideration of data garnered from other less explicit sources such as nurses' clinical judgement.

The theme of marrying nurses' clinical judgement with the use of the EWS is supported and reflected in the findings of previous QESs, which also recognised the role clinical judgement played in facilitating escalation of care by healthcare staff (Connolly et al., 2017; O'Neill et al., 2021). Nurse's value their own clinical judgement, experience, intuition, physical assessment findings and decision-making skills when recognising the deteriorating patient. A recently published QES that explored the role human factors played in deciding whether to escalate care reflected a similar repertoire of skills (Ede et al., 2021).

Effective communication is imperative for nurses responding to deteriorating patients (Loftus & Smith, 2018). The communication methods/tools/processes used by nurses to convey an EWS and related clinical judgement information to other members of the multidisciplinary team, and the credibility ascribed to it by their medical colleagues warrants review. The (I)SBAR (Identify Situation Background Assessment Recommendation) is a patient safety communication tool that is used in conjunction with EWS to facilitate structured and effective communication between healthcare workers (Moi et al., 2019). However, this review exposed a lack of discussion from nurses about the use and merits of (I)SBAR as a communication tool when escalating care, which is surprising as it is used in the UK where most of the included studies originated from. Surprisingly, only two studies in this review provided verbatim quotes from nurses on (I)SBAR, which stated that it was not actively used and that (I)SBAR was the subordinate to the EWS (Foley & Dowling, 2019, p1188; Mackintosh, 2012, p225). One nurse acknowledged that while she endeavoured to use (I)SBAR, in stressful situations, it was difficult (Foley & Dowling, 2019, p1188). A study by Ludikhuize et al. (2011) similarly showed how only one out of 47 nurses used (I)SBAR when escalating care. More recent studies on (I)SBAR suggest summarising complex cases can be difficult (Burgess et al., 2020) and in addition, there is a perception that (I)SBAR can take years to master, suggesting more training and simulation may be needed (Moi et al., 2019).

The paucity of commentary on (I)SBAR in this review could be because of the challenges nurses face when using the tool, but it also raises the issue of its perceived relevance. The review found that nurses valued EWS information due to its SMART evidence and common language, which strengthened their argument to prompt an initial medical response. Further escalation requires multifaceted communication amongst multidisciplinary team members. This is unlikely to take the (I)SBAR format, given the complexity of clinical decision making related to acuity and deterioration. This review illuminated the need for further studies around the communication processes, which are aligned to the EWS tool and protocols and in particular the use of (I)SBAR.

Whilst the specificity and timely nature of the EWS tool functioned well for nurses when escalating care, this review found the process for modification of EWS parameters proved challenging. Communication processes were hindered by the reluctance of doctors to modify and document EWS parameters. Previous QESs similarly described doctors' aversion to EWS modifications as a barrier to EWS protocol (Connolly et al., 2017; O'Neill et al., 2021). While it is seen principally as the doctor's role to modify parameters some studies appear to suggest a possible role for nurses. Foley and Dowling (2019) suggested that it may be plausible for nurses to adjust EWS parameters. However, Jensen et al. (2019) argued that most nurses due to their varying levels of competence and experience considered this to be a doctor's task. The review findings demonstrate that a clearer process is required in relation to the modification of EWS parameters and distinct policies and structures outlining with whom this responsibility lies are required.

The recent COVID-19 crisis has given rise to increased staff shortages and heavier workloads and accessing doctors to adjust parameters have proved difficult. From an Irish perspective, the recognised reluctancy of physicians to alter EWS parameters has been addressed and circumvented in the revised INEWSV2 recommendations, which states that parameters must not be altered (Department of Health, 2020, p.2). Furthermore, it recommends that the INEWS escalation and response protocol must not be modified for the first 24 hours following admission to hospital. Thereafter, a registrar or

consultant may modify only the escalation and response protocol, whilst not veering from the accepted EWS scoring mechanism (DOH 2020, p.5). Ongoing research and clinical audits will be required to measure the impact of these recommendations on patient care and staff workload.

The theme of the EWS being perceived as both a blessing and a curse by nurses was clearly exhibited in the review. Nurses described the sense of empowerment EWS gave them not only in supporting their decisions but at the same time offering them legal protection. This was similarly supported in the literature by O'Neill et al. (2021), which highlighted the governance the EWS protocol provided to escalation of care processes. Whilst acknowledging the sense of control the EWS protocol brought to the escalation process, conversely, nurses recounted their experiences of the excessive EWS triggering that can result from patients whose baseline vital signs lie outside the normal range with chronic illnesses, for example COPD. These sentiments were corroborated by O'Neill et al. (2021) who found that the inability of the tool to cater for these patients is persistently problematic and challenging. In view of an aging population living with comorbidities, nurses need an EWS tool that has a greater capacity for adaptation or a better degree of flexibility to support patients' needs.

The impact of the hospital domain on nurses use of EWS was evidenced in this review particularly in issues around hierarchy, cross professional communication processes and boundaries, poor staffing, increased workloads and delayed medical response. Similar findings have been echoed in recent QES's (Connolly et al., 2017; Ede et al., 2021; O'Neill et al., 2021). Cross professional communication processes were a common key theme and though EWS is recognised as valuable in this respect, equally it causes feelings of frustration and conflict as unwritten role boundaries are not observed, since referrals may go outside the usual hierarchical line of communication. Ede et al. (2021) discusses the concept of a "flattened hierarchy" whereby any staff member may refer to another, but this is nonspecific and problematic. A flattened hierarchy is an admirable ideal, however, this review found that senior nurses were more confident when escalating care and most nurses favoured escalating to a higher level, suggesting hierarchical influences within the hospital domain prevail.

In addition, nurses remarked on an ill-equipped out-of-hours service in hospitals, reflecting a need for access to increased senior medical decision makers during out-of-hours time. A further challenge within the hospital domain was the impact of the physical environment on work practices. Infection control has been amplified in the recent COVID-19 pandemic, resulting in patients requiring individual rooms on admission to hospital. International healthcare bodies support the engagement of patient participation as an essential part of person-centred care (Oxelmark et al., 2018). The layout of some modern hospitals may not always allow nurses the required visualisation of patients to optimise their safety and care needs (Mackintosh, 2012), thus illuminating the conceivable future role of the patient in self-escalation.

4.1 | Implications for clinical practice

Global healthcare policy places great emphasis on prevention of problems before they occur, and this can be supported through early surveillance and strengthening of EWS response systems. This review demonstrates that in clinical practice, nurses view EWS as a SMART communication tool for escalating care and securing a response; however, solely relying on the EWS tool alone when assessing the patient is ill-advised. A significant finding of this review was that the EWS tool is not infallible and there can be inconsistencies with the score; nurses must be mindful of using a multidimensional approach in the assessment of patients in clinical practice. This approach is supported in the Irish healthcare domain as the first recommendation on the revised national INEWSV2 chart is that the EWS is used as an adjunct to clinical judgement. This acknowledgement of the value of clinical judgement in the anticipation, recognition, escalation, response and appraisal of patient deterioration supports the recommended multidimensional approach aligned to the findings of this review.

4.2 | Potential for future research

The findings of this review reflect nurses' experiences spanning seven countries across three continents. The differences in health care systems and the nuances within, may account for the lack of commentary from nurses on (I)SBAR when describing escalation of care episodes. Comparison of communication systems in differing healthcare systems may provide insight into optimal ways in which to communicate patient deterioration and escalation. In particular, examination of the communication processes used to instigate an escalation of care namely (I)SBAR and nurses' views around its effectiveness warrants analysis. Studies are needed to investigate nurses' experiences of using updated versions of EWS protocols that consider nurses clinical judgement and impact on patient outcome. The impact of hospital physical environment on nurses decision making is worth investigating to determine validity. The potential role patients and families play in instigating or encouraging an escalation of care will need to be explored.

4.3 | Strengths and Limitations

This review strengthens the arguments for an EWS systematic approach and the use of the EWS tool as a SMART form of communication when escalating care. Using GRADE–CERQual, we assessed confidence in the eighteen review findings. The estimation of high confidence in five review findings was influenced by the studies' broad geographical spread and rich data provided. Another strength of the review was the team approach undertaken for the synthesis (Centre for Reviews & Dissemination, 2001). Whilst the search strategy was accurate, only studies published in the English language were included, and all included nurses from Westernised cultures in economically advanced countries.

5 | CONCLUSION

The COVID-19 pandemic has highlighted the vulnerability of patients with chronic illnesses and older patients with comorbidities. Nurses need systems in place that can support them in the delivery of better and safer care. This qualitative evidence synthesis demonstrates that nurses' escalation of care requires an early warning *system* approach. This systematic approach involves nurses using their clinical judgement and EWS, demonstrating SMART communication processes and working within the complexities of the EWS protocol inside the hospital domain. Further evaluation of the communicating processes used by nurses to escalate care could help to enhance this system further. Internationally, improvements such as advanced nurse practitioner response (ANP) systems, EWS consultant champions and digital monitoring systems are all steps forward in providing reliable effective care to the most acutely ill and deteriorating patients. Overall, the use of EWS and subsequent escalation of care by nurses is nuanced and more complex than perhaps envisaged. There is a need for ongoing nurse education and clinically focused research around the processes and its components.

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CONFLICT OF INTEREST STATEMENT

The authors both confirmed that they have no potential sources of conflict of interest. We have no interest or relationship, financial or otherwise that might be perceived as influencing our objectivity. We have no potential sources of conflict such as patent or stock ownership, membership of a company board of directors, membership of an advisory board or committee for a company and consultancy for or receipt of speaker's fees from a company.

DATA AVAILABILITY STATEMENT

Authors can confirm that all relevant data supporting the findings of this study are available within the article and its supplementary information files. Data presented in the study findings were developed after a synthesis of existing data from primary sources, which are available at locations cited in the reference section. If there is any information or further clarification required in terms of the final datasets supporting the findings of this study, they are available on request from the corresponding author [Y.C].

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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