CICER
Tacaíocht don Treoirlíne Chliniciúil
Clinical Guideline Support

# PAEDIATRIC EARLY WARNING SYSTEMS IN EMERGENCY SETTINGS

## Systematic review of clinical guidelines

**February 2026**

Health Information and Quality Authority
An tÚdarás Um Fhaisnéis agus Cáilíocht Sláinte

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
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NATIONAL CLINICAL EFFECTIVENESS COMMITTEE

HRB An Bord Taighde Sláinte Health Research Board

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## About CICER

In 2016, the Department of Health requested that the Health Research Board (HRB) fund an evidence synthesis service to support the activities of the Ministerially appointed National Clinical Effectiveness Committee (NCEC). Following a competitive process, HIQA was awarded research funding spanning the period from 2017 to 2024 to produce evidence to support the development of National Clinical Guidelines and National Clinical Audits. This funding was renewed through a competitive process to support the work of the Centre in Ireland for Clinical guideline support and Evidence Reviews (CICER) from 2024 to 2028. The CICER team comprises a dedicated multidisciplinary research team supported by staff from the Health Technology Assessment team in HIQA, the Discipline of Public Health and Primary Care in the School of Medicine in Trinity College Dublin, as well as national and international clinical and methodological experts.

With regard to clinical guidelines, the role of the CICER team is to independently review evidence and provide scientific support for the development, by guideline development groups (GDGs), of National Clinical Guidelines for the NCEC. The CICER team undertakes systematic reviews of the clinical effectiveness and cost-effectiveness of interventions included in the guidelines, as well as estimating the budget impact of implementing the guidelines. The CICER team also works closely with the GDGs and provides tailored training sessions; assists in the development of clinical questions and search strategies; performs systematic reviews of international clinical guidelines and supports the assessment of their suitability for adaption to Ireland; and supports the development of evidence-based recommendations informed within the National Clinical Guidelines.

### How to cite this report:

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## Plain Language Summary

Each year, there are about 400,000 visits by children to emergency departments in Ireland. When they arrive, a nurse or doctor checks how sick they are. This is called “triage” and it helps make sure the sickest children are treated first. But sometimes, a child’s condition can suddenly get a lot worse while they are in the emergency department. This can happen with serious illnesses like sepsis, which is a life-threatening reaction to an infection.

One way to spot when a child is getting sicker is by using an “early warning system.” These systems help doctors and nurses notice signs of serious illness early and act quickly. In Ireland, early warning systems are already used for children and adults in hospital wards and for adults in emergency departments. Right now, there is no early warning system for children in emergency departments. The symptoms of serious illness can look different in children compared to adults. Also, the kinds of measurements that are possible in the emergency department are different from inpatient hospital wards. That is why children in the emergency department need an early warning system designed for them.

This report looks at whether there are any guidelines from other countries about using early warning systems for children in the emergency department. We searched carefully through databases of scientific reports and websites of health organisations internationally. We did not find any relevant guidelines from other countries that could be used to help build an Irish guideline.

# Table of Contents

# List of Tables

## List of abbreviations that appear in this report

| | |
|---|---|
| **BC** | British Columbia |
| **CICER** | Centre in Ireland for Clinical guideline support and Evidence Reviews |
| **ED** | emergency department |
| **EMEWS** | Emergency Medicine Early Warning System |
| **EWS** | early warning system |
| **GDG** | guideline development group |
| **GRADE** | Grading of Recommendations, Assessment, Development, and Evaluations |
| **HIQA** | Health Information and Quality Authority |
| **HRB** | Health Research Board |
| **ICTS** | Irish Children's Triage System |
| **NCEC** | National Clinical Effectiveness Committee |
| **PEWS** | Paediatric Early Warning System |
| **PICO** | population, intervention, comparison, outcome |
| **PIC** | population, interest, context |
| **POPS** | Paediatric Observation Priority Score |
| **PRISMA** | Preferred Reporting Items for Systematic Reviews and Meta-Analyses |
| **UK** | United Kingdom |

# 1 Background

## 1.1 Description of the problem

Every year, there are approximately 1.7 million visits to emergency departments (EDs) and injury units in Ireland.[1] Of these, approximately 400,000 are by children less than 16 years of age. In Ireland, in the years 2019-2023, the vast majority of paediatric deaths (63% for ages 1-14 and 92% for those aged under 1 year) occurred in the hospital setting.[2]

When a patient arrives to the ED, a triage assessment is conducted to determine the severity of their condition and to assign a priority level based on urgency. This system is designed to help ensure that those with the most critical needs receive immediate attention. Between initial triage and disposition (the decision to discharge or admit), a patient's condition may unexpectedly worsen, leading to a deterioration in their vital signs, mental status, or other indicators of their overall health.

There are several conditions that may lead to life-threatening post-triage deterioration among children in the ED. These can include sepsis, shock, and respiratory illness. It can be challenging to recognise post-triage clinical deterioration for a number of reasons. The ED can be a challenging care environment, with patients presenting with a diverse range of urgent conditions and comorbidities in a context of finite resources.

Detecting clinical deterioration in children can be especially difficult. Children may have a limited ability or unwillingness to communicate their symptoms and precipitating events. They also tend to have a higher capacity for early physiological compensation that can mask clinical signs of deterioration: for example, hypotension (drop in blood pressure) during shock may show up later than expected in children,[3, 4] and then deteriorate very quickly.[5-7] The term “child” also encompasses a diverse range of ages, and normal vital signs vary substantially between neonates and adolescents.[6, 8] Even when clinical deterioration is recognised, there can be barriers to effectively escalating the issue, including lack of standardisation and a lack of clinical confidence.[9]

Early warning systems (EWSs) are one way to help clinicians identify and communicate

clinical deterioration. EWSs are a combination of an afferent (recognition) scoring system with an efferent (response) pathway delineating clear escalation actions and plans for patient review and intervention. They are used in healthcare settings to identify and track potential deterioration in a patient's condition. Originally developed for use and implemented with inpatients (adult and paediatric), they are now being explored for ED settings.

## 1.2 Relevant clinical practice guidance

There is no existing Irish National Clinical Guideline focused on a post-triage EWS for paediatric patients in unscheduled care. However, there are several national clinical guidance documents in Ireland focusing on triage and post-triage systems in paediatric and or ED settings, the most relevant being the following:

- The Irish Paediatric Early Warning System (PEWS)[10]

The latest version of this National Clinical Guideline was published by the NCEC in 2016 and applies only to infants and children less than 16 years of age admitted to **inpatient** settings in Ireland. Its aim is to improve prevention and recognition of, and response to, children at risk of clinical deterioration in paediatric inpatient settings through the implementation of a standardised paediatric early warning system. The system encompasses national paediatric observation charts, PEWS scoring tool and escalation guide, effective communication, timely nursing and medical input, and documentation. The core scoring parameters of the PEWS scoring tool include clinician/family concern, respiratory rate, respiratory effort, oxygen therapy, heart rate, and level of consciousness.

- Emergency Medicine Early Warning System (EMEWS)[11]

This National Clinical Guideline was published by the NCEC in 2018 and applies to **adult patients (16 years and older) attending an ED** in Ireland. Its purpose is to implement a standardised emergency medicine early warning system in order to improve the recognition and response to clinical deterioration in adult patients in the ED. The system encompasses national observation charts, the EMEWS scoring tool, and escalation of care and clinical communication. The EMEWS scoring tool includes respiratory rate, oxygen saturation, fraction of inspired oxygen, heart rate, systolic blood pressure, temperature, and level of consciousness.

- Irish Children's Triage System (ICTS)[12]

The second edition of this tool was published by the Health Service Executive in 2021 and applies to children less than 16 years of age presenting to EDs in Ireland. It outlines the Irish Children's Triage System (ICTS) for the prioritisation and assessment of paediatric ED patients. In contrast to the two guidelines mentioned above, the ICTS guidance is currently primarily **focussed on initial triage**, not ongoing, post-triage recognition of (and response to) clinical deterioration. As shown in Table 1.1, none of the existing Irish guidance presents a post-triage EWS for children in the ED.

**Table 1.1 Existing relevant clinical guidance in Ireland relevant to triage or post-triage in unscheduled care and or paediatrics**

| Name of guidance | Tool type | Age group | Setting |
|---|---|---|---|
| The Irish Paediatric Early Warning System (PEWS)[10] | Post-triage early warning system | Children <16 years | Inpatient |
| Emergency Medicine Early Warning System (EMEWS)[11] | Post-triage early warning system | Adults 16 years or older | Emergency department |
| Irish Children's Triage System (ICTS)[12] | Triage system | Children <16 years | Emergency department |

## 1.3 Purpose of this review

The purpose of this review is to identify and appraise current state, national or international clinical guidelines on paediatric emergency medicine early warning systems, that could potentially be used as part of an "ADAPTE" process[13] to support the development of a National Clinical Guideline on a children's emergency medicine early warning system in Ireland.

# 2 Methods

This systematic review of international clinical guidelines on paediatric early warning systems in emergency settings was carried out in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria (Appendix 1). Full details of this systematic review of international clinical guidelines are available in the published protocol at www.higa.ie/sites/default/files/2025-08/CEMEWS-Protocol.pdf.[14] No deviations from the protocol occurred.

## 2.1 Review question

This review considered the following question:

- What relevant clinical guidelines on paediatric emergency medicine early warning systems are currently in use nationally and internationally?

The review question was formulated in line with the Population, Interest, Context (PIC) framework, a modified version of the PICO (Population, Interest, Context, Outcome) framework, as presented in Table 2.1.

**Table 2.1 Population, Interest, Context for review of guidelines**

| | |
|---|---|
| **Population** | Children (less than 16 years of age) attending emergency departments and or urgent care facilities |
| **Interest** | Clinical guidelines that describe the use of post-triage early warning systems for children less than 16 years of age attending unscheduled care |
| **Context** | ▪ Clinical guidelines (state, national, international level) as defined in Table 2.2<br>▪ Local or hospital-specific guidelines will be excluded |

## 2.2 Eligibility criteria

The inclusion and exclusion criteria for this review are provided in Table 2.2. Clinical guidelines are defined as 'systematically developed statements about specific health problems, intended

to assist practitioners and patients in making decisions about appropriate health care', as per the "ADAPTE" collaboration definition.[13]

**Table 2.2 Inclusion and exclusion criteria**

| Inclusion criteria | Exclusion criteria |
|---|---|
| Guidelines that:<br>▪ cover emergency departments and or urgent care facilities<br>▪ include recommendations about post-triage early warning systems for children less than 16 years of age attending unscheduled care<br>▪ are at state, national, or international level<br>▪ clearly state the systematic approach and evidence base that underpins the guideline recommendations<br>▪ include a rating of the quality of evidence that underpins the recommendations using an approach such as the Grading of Recommendations Assessment, Development and Evaluation (GRADE)[15]<br>▪ are novel or have been adapted. | Guidelines that:<br>▪ refer only to other care settings, such as primary care or outpatient clinics, GP out-of-hours services, prehospital services, or inpatient hospital settings<br>▪ focus only on initial triage systems or scores<br>▪ refer only to adults aged 16 years or older<br>▪ are at local or hospital level<br>▪ have been superseded by a more recent guideline<br>▪ are adopted directly from, or duplicate, another guideline<br>▪ were published prior to 2015<br>▪ not published in English. |

**Key:** GRADE - Grading of Recommendations Assessment, Development, and Evaluation

## 2.3 Search strategy

Electronic searches were conducted in Medline via EBSCOhost, Embase via Elsevier, and in CINAHL Complete and PsycINFO via EBSCOhost on 23 June 2025. The search strategy was designed by a HIQA librarian and peer reviewed by a second librarian in the Health Service Executive library. The search terms are provided in the protocol[14] and full documentation of search strategies is available in the open repository Zenodo: https://zenodo.org/records/17226547. Grey literature sources, including guideline repositories, guideline developer websites, websites of national ministries of health and specific clinical specialty websites listed in the protocol,[14] were searched between 18 June and 8 August 2025. Searches were conducted for key terms within each organisation's website and the first 50 hits within each site were reviewed for potentially eligible guidelines.

## 2.4 Selection of eligible publications

All citations identified from database searching were exported to EndNote (Version 21) for reference management,[16] where duplicates were identified and removed. Using Covidence,[17] two reviewers independently reviewed the titles and abstracts of the remaining citations to identify those for full-text review. Where disagreements occurred, discussions were held to reach consensus and where necessary, a third reviewer was involved. Citations excluded during the full-text review stage were documented alongside the reasoning for their exclusion and compiled in a study flow diagram (Figure 3.1).

## 2.5 Data extraction and quality appraisal

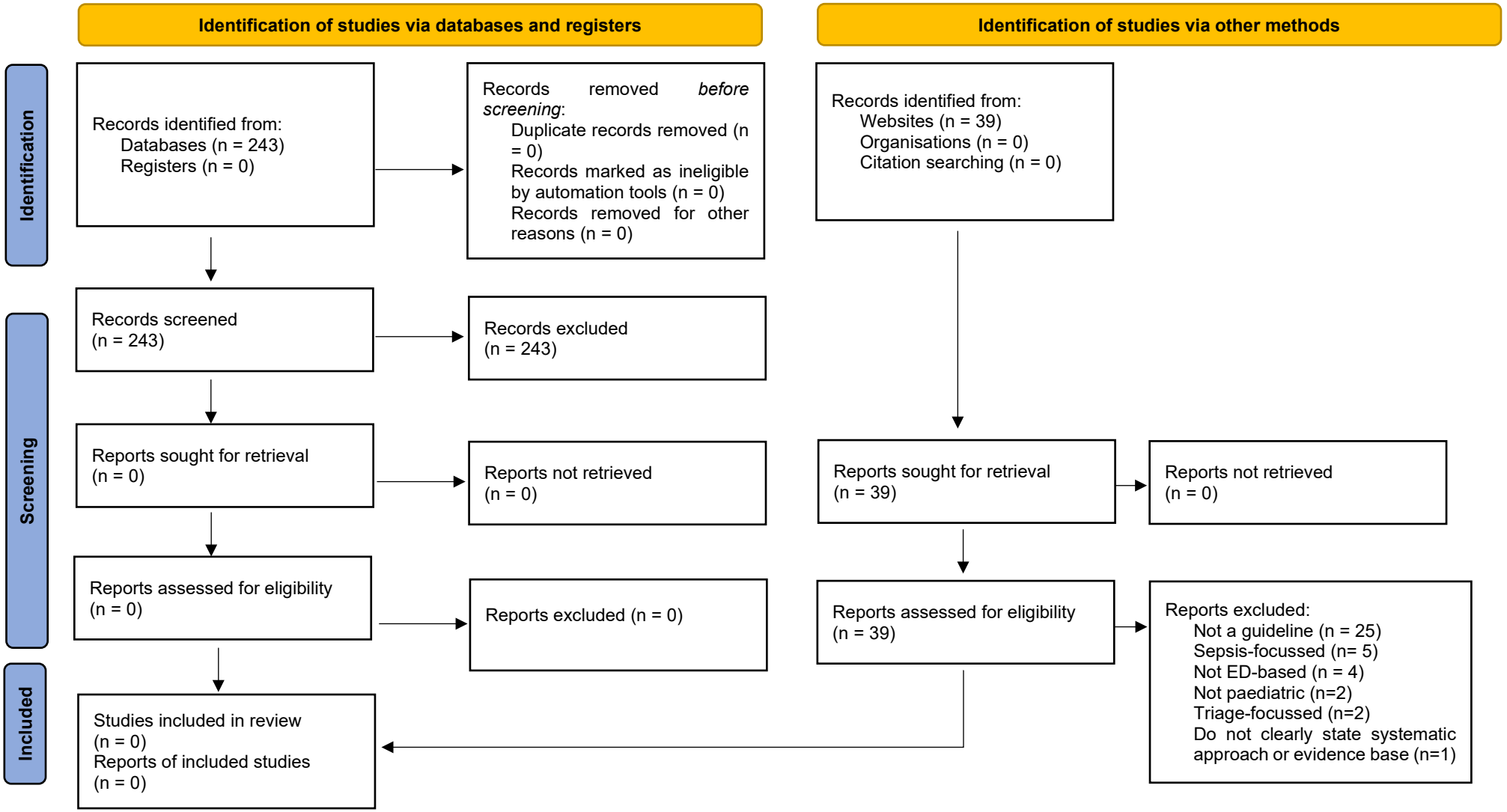
The protocol outlined the planned process for data extraction and quality appraisal. However, no eligible guidelines were located during the search and therefore data extraction and quality appraisal were not applicable.

# 3 Results

## 3.1 Search results

The search strategy outlined in Section 2.3 was run on 23 June 2025, and a total of 243 records were identified from scientific databases. The titles and abstracts were screened independently by two reviewers. None of the database records were found eligible for full-text screening. Between 18 June and 8 August 2025, a total of 62 websites were screened independently by two reviewers. A total of 39 reports were located and full-text reviewed during the website search. The located reports were ineligible for a variety of reasons, being: not a guideline (n=25); sepsis-focussed (n=4); not ED-based (n=5); not paediatric (n=2); or triage-focused (n=2). One located report was a province-level paediatric guideline published in June 2025 detailing an early warning system for the ED, called the Child Health British Columbia Provincial Pediatric Early Warning System Guideline.[18] However, this guideline did not describe the process of locating and evaluating the certainty of evidence for each recommendation and did not include a rating of the certainty of evidence that underpinned each recommendation. Therefore, it did not meet the criteria for the current review.

**Figure 3.1 PRISMA Flow diagram recording the stages of the search process**



# 4 Discussion

Although no eligible guidelines were located during this systematic search, a number of potentially useful resources emerged that provide background information and potential upcoming developments.

The Child Health British Columbia Provincial Pediatric Early Warning System Guideline[18] and accompanying resources, while not meeting our inclusion criteria, does provide some helpful information. The aim of the guideline is to provide direction for the use of the British Columbia Pediatric Early Warning System (BC PEWS), to support the early recognition, mitigation, notification, and response to paediatric patients at risk of deterioration in the ED and inpatient settings. The guideline describes a five-component system, featuring a paediatric early warning score, documentation, situational awareness including caregiver concern, escalation of care, and a communication framework. The score component includes respiratory, cardiovascular (blood pressure is documented but not scored), behaviour, vomiting, and bronchodilator use indicators. The guideline includes age-stratified versions of the BC PEWS ED, as well as implementation resources like quality improvement tools, online learning, flowsheets, documentation instructions, posters, lanyard cards, and escalation aids. The guideline developers report that over 100 facilities across the province have implemented BC PEWS ED in their EDs. Although the guideline does not include systematic searching, quality appraisal, or grading of certainty of evidence, it does cite a research study underpinning the guideline. That before-and-after pilot study[19] was conducted in a public general hospital in British Columbia; it had positive implementation outcomes in terms of fidelity (documentation) and clinician acceptability, but clinical effectiveness outcomes were not assessed.

We identified several evidence syntheses focusing on paediatric early warning systems during the course of the review. Chong et al.'s 2022 systematic review[20] located 15 studies published between 2006 and 2022 that focused on children aged under 18 in inpatient units and EDs and compared patient populations with PEWS to those without PEWS. They found an increased risk for mortality (pooled relative risk: 1.18, 95% CI 1.01–1.38, p = 0.036) in the group without PEWS compared to the group with PEWS. However, implementation in the ED was not reported on separately, and a significant number of the identified studies appear to be located in inpatient only. Considine et al.[21] conducted a scoping review of

systems for recognition and response to deteriorating ED patients, and located three primary studies that focused on children only and three studies that focused on adults and children together. They reported that all studies were observational and tended not to focus on the "response" aspect of early warning systems while the patient was still in the ED.

There were multiple statements by professional organisations pertaining to monitoring and responding to clinical deterioration in paediatric patients in the ED. The Royal College of Emergency Medicine in the United Kingdom (UK) issued a position statement in January 2024 addressing the "development and publication of the new national Paediatric Early Warning Score (nPEWS) for hospitalised children".[22] They observe that the nPEWS was not specifically validated for use in ED patients; they note that "the national team is working on creating an aligned version specifically for EDs, utilising components of scores like POPS [Paediatric Observation Priority Score, which includes heart rate, respiratory rate, temperature, oxygen saturation, breathing, and consciousness] which are already shown to add value, to link with the inpatient version but this is not yet available". The statement notes that an ED version of PEWS is likely to have different escalation criteria from the inpatient version and is likely to omit the mandate to undertake blood pressure measurements on all children.

The UK Royal College of Paediatrics and Child Health hosts a webpage[23] (last modified 25 July 2025) dedicated to the PEWS and its ongoing scale-up as part of the System-wide Paediatric Observation Tracking programme in England. They note that the PEWS chart was designed for children in the inpatient setting and that features such as blood pressure and temperature measurement may not be well-suited to the emergency setting. They note that "it has always been the aim of the national team to produce an Emergency Department aligned version of the inpatient PEWS chart; however, development, testing and validation of this is going to take at least 12 months". Outreach to the team confirmed that piloting is ongoing as of September 2025; they are not currently planning to produce a clinical guideline on an ED-based PEWS. Of interest is the October 2025 update of their *Standards for Children in Emergency Care Settings* and associated guidance. It recommended that "all EDs treating CYP [children and young people] should use an appropriate Paediatric Early Warning System (PEWS) for recording patient observations".[24] The Scottish Patient Safety Paediatric Programme compiles resources to improve the recognition, response and review of

deteriorating children in Scotland, including PEWS charts and training opportunities. They are currently undertaking a 10-year review of Scottish PEWS: outreach to that team confirmed that they are not currently planning to create a guideline for PEWS in the ED, but that challenges in relation to its use in the ED may be covered as part of their 10-year review.

Finally, the College of Emergency Nursing Australasia and Australasian College for Emergency Medicine issued a joint position statement in November 2023[25] on vital signs monitoring in EDs for adults and children. They include minimum standards for vital sign assessment in the ED for children (including defining a core set of vitals and frequency of monitoring) and specify that systems should be in place in the ED to monitor and respond to abnormal vital signs.

There are several limitations to the current review. Although we aimed to conduct a comprehensive grey literature search, it is possible that there is a relevant organisation or guideline that was overlooked during the process. Furthermore, while our search strategy included synonyms for “early warning system”, it is possible that a guideline that used an unexpected term to describe this complex intervention may have been missed.

In summary, we did not identify any de novo or adapted clinical guideline during this review that: covered EDs; included recommendations about early warning systems for children; was at state, national, or international level; clearly stated the systematic approach and evidence base; and included a rating of the quality of evidence.

Although there are several ED-based PEWS at various stages of development, piloting, and evaluation, they do not yet appear to be translated into an evidence-based clinical guideline. The inpatient PEWS is more well-established in Ireland and internationally and has dedicated guidance available.[10] However, inpatient PEWSs may include features such as blood pressure and temperature measurement, that may not be well-suited to the emergency setting. Statements from professional organisations suggest that an ED-based PEWS guideline will likely require both a bespoke early warning scoring system and tailored implementation resources to reflect the emergency setting and paediatric population.

## References

1. Health Service Executive (HSE). Hospital activity update - October 2024 [Internet].

Dublin: HSE; 2024 [updated 6 December 2024. Available from: https://www.hse.ie/eng/about/who/acute-hospitals-division/hospital-activity/hospital-activity-update-october-2024.html.
2. National Office of Clinical Audit (NOCA). National Paediatric Mortality Register Annual Report 2025. Internet. Dublin: 2025 2025 May 08. Report No.
3. Matthews NT. Paediatric Trauma. In: Bersten AD, Soni, N., editor. Oh's Intensive Care Manual. 6 ed. Oxford: Butterworth-Heinemann; 2008.
4. The Royal Children's Hospital Melbourne. How are children different [Internet]. Melbourne: RCH; 2025 [cited 2025 June 04]. Available from: https://www.rch.org.au/trauma-service/manual/how-are-children-different/.
5. Jensen CS, Lisby M, Kirkegaard H, Loft MI. Signs and symptoms, apart from vital signs, that trigger nurses' concerns about deteriorating conditions in hospitalized paediatric patients: A scoping review. Nurs Open. 2022;9(1):57-65.
6. Molyneux L, Paris, Rebecca, Ross, Oliver. Recognising the seriously ill child. Update in Anaesthesia. 2015;30:224-35.
7. Vakharia K, Tidy, C. Resuscitation in hypovolaemic shock [Internet]. London: Patient (Navigate Health); 2022 [cited 2025 June 04]. Available from: https://patient.info/doctor/resuscitation-in-hypovolaemic-shock.
8. Meyburg J, Bernhard M, Hoffmann GF, Motsch J. Principles of pediatric emergency care. Dtsch Arztebl Int. 2009;106(45):739-47; quiz 48.
9. O'Neill SM, Clyne B, Bell M, Casey A, Leen B, Smith SM, et al. Why do healthcare professionals fail to escalate as per the early warning system (EWS) protocol? A qualitative evidence synthesis of the barriers and facilitators of escalation. BMC Emerg Med. 2021;21(1):15.
10. Department of Health. The Irish Paediatric Early Warning System (PEWS) (NCEC National Clinical Guideline No. 12). Dublin: 2016.
11. Department of Health. Emergency Medicine Early Warning System (NCEC National Clinical Guideline No. 18). Dublin: 2018.
12. ICTS National Steering Group National Emergency Medicine Programme Working Group. Irish Children's Triage System (ICTS). Dublin: 2016.
13. The ADAPTE Collaboration. The ADAPTE Process: Resource Toolkit for Guideline Adaptation. Version 2.0 [Internet]. Guideline International Network; 2010 [cited 2025 August 5]. Available from: https://g-i-n.net/wp-content/uploads/2021/03/ADAPTE-Resource-toolkit-March-2010.pdf.
14. Larkin C, O'Neill M, Carrigan M, Wallace L, S.M. S, Ryan MP. Paediatric Early Warning Systems In Emergency Settings: Protocol For A Systematic Review Of Clinical Guidelines. Cork: 2025.
15. Guyatt GH, Oxman AD, Schünemann HJ, Tugwell P, Knottnerus A. GRADE guidelines: a new series of articles in the Journal of Clinical Epidemiology. J Clin Epidemiol. 2011;64(4):380-2.
16. The EndNote Team. EndNote 21 ed. Philadelphia: Clarivate; 2023.
17. Veritas Health Information. Covidence systematic review software [Internet]. Melbourne: Veritas Health Information; 2025 [Available from: www.covidence.org.
18. Child Health BC. Child Health BC Provincial Pediatric Early Warning System Guideline. British Columbia: 2025.
19. McElroy T, Swartz EN, Hassani K, Waibel S, Tuff Y, Marshall C, et al. Implementation study of a 5-component pediatric early warning system (PEWS) in an emergency

department in British Columbia, Canada, to inform provincial scale up. BMC Emergency Medicine. 2019;19(1):74.

20. Chong SL, Goh MSL, Ong GY, Acworth J, Sultana R, Yao SHW, et al. Do paediatric early warning systems reduce mortality and critical deterioration events among children? A systematic review and meta-analysis. Resusc Plus. 2022;11:100262.
21. Considine J, Fry M, Curtis K, Shaban RZ. Systems for recognition and response to deteriorating emergency department patients: a scoping review. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine. 2021;29(1):69.
22. RCEM Position Statement Paediatric Early Warning Scores 26 January 2024 [press release]. London: Royal College of Emergency Medicine,2024.
23. Royal College of Paediatrics and Child Health. UK Paediatric Early Warning Systems (PEWS): 2025 [Available from: https://www.rcpch.ac.uk/resources/UK-paediatric-early-warning-systems.
24. Royal College of Paediatrics and Child Health. Standards for Children in Emergency Care Settings, 5th ed. London: 2025.
25. Joint Position Statement on Vital Signs Monitoring in Emergency Departments [press release]. Victoria: College of Emergency Nursing Australasia / Australasian College for Emergency Medicine,2023.

# Appendix 1: PRISMA checklist

| Section and Topic | Item # | Checklist item | Location where item is reported |
|---|---|---|---|
| **TITLE** | | | |
| Title | 1 | Identify the report as a systematic review. | Cover page |
| **ABSTRACT** | | | |
| Abstract | 2 | See the PRISMA 2020 for Abstracts checklist. | NA |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of existing knowledge. | Sections 1.1, 1.2 |
| Objectives | 4 | Provide an explicit statement of the objective(s) or question(s) the review addresses. | Section 1.3, 2.1 |
| **METHODS** | | | |
| Eligibility criteria | 5 | Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses. | Section 2.2 |
| Information sources | 6 | Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted. | Section 2.3 |
| Search strategy | 7 | Present the full search strategies for all databases, registers and websites, including any filters and limits used. | Section 2.3 |
| Selection process | 8 | Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process. | Section 2.4 |
| Data collection process | 9 | Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process. | NA |
| Data items | 10a | List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect. | NA |
| | 10b | List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information. | NA |
| Study risk of bias assessment | 11 | Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process. | NA |
| Effect measures | 12 | Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results. | NA |
| Synthesis methods | 13a | Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)). | NA |

| Section and Topic | Item # | Checklist item | Location where item is reported |
|---|---|---|---|
| | 13b | Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions. | NA |
| | 13c | Describe any methods used to tabulate or visually display results of individual studies and syntheses. | NA |
| | 13d | Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used. | NA |
| | 13e | Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression). | NA |
| | 13f | Describe any sensitivity analyses conducted to assess robustness of the synthesized results. | NA |
| Reporting bias assessment | 14 | Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases). | NA |
| Certainty assessment | 15 | Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome. | NA |
| **RESULTS** | | | |
| Study selection | 16a | Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram. | Section 3.1 |
| | 16b | Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded. | Section 3.1 |
| Study characteristics | 17 | Cite each included study and present its characteristics. | NA |
| Risk of bias in studies | 18 | Present assessments of risk of bias for each included study. | NA |
| Results of individual studies | 19 | For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots. | NA |
| Results of syntheses | 20a | For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies. | NA |
| | 20b | Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect. | NA |
| | 20c | Present results of all investigations of possible causes of heterogeneity among study results. | NA |
| | 20d | Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results. | NA |
| Reporting biases | 21 | Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed. | NA |
| Certainty of evidence | 22 | Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed. | NA |
| **DISCUSSION** | | | |
| Discussion | 23a | Provide a general interpretation of the results in the context of other evidence. | Section 4 |

| Section and Topic | Item # | Checklist item | Location where item is reported |
|---|---|---|---|
| | 23b | Discuss any limitations of the evidence included in the review. | NA |
| | 23c | Discuss any limitations of the review processes used. | Section 4 |
| | 23d | Discuss implications of the results for practice, policy, and future research. | Section 4 |
| **OTHER INFORMATION** | | | |
| Registration and protocol | 24a | Provide registration information for the review, including register name and registration number, or state that the review was not registered. | Section 2 |
| | 24b | Indicate where the review protocol can be accessed, or state that a protocol was not prepared. | Section 2 |
| | 24c | Describe and explain any amendments to information provided at registration or in the protocol. | Section 2 |
| Support | 25 | Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review. | Page 2 |
| Competing interests | 26 | Declare any competing interests of review authors. | Page 2 |
| Availability of data, code and other materials | 27 | Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review. | NA |

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