

REVIEW ARTICLE

Signs and symptoms, apart from vital signs, that trigger nurses' concerns about deteriorating conditions in hospitalized paediatric patients: A scoping review

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Abstract

Aim: This scoping review aimed to identify and map the signs and symptoms—apart from vital signs—that trigger nurses' concerns about the deteriorating conditions of hospitalized paediatric patients.

Design: A scoping review was conducted in accordance with the Joanna Briggs Institute methodology.

Methods: Six databases, including MEDLINE, CINAHL, Embase, Scopus, Swemed and ProQuest Dissertations and Theses databases, were searched systematically. Of 5795 citations, seven matched the inclusion criteria.

Results: Objective observations, such as the patient's colour, pain-level changes, and behavioural observations, were identified as signs that would trigger nurses' concerns. Nurse's intuitive feelings or gut feelings when seeing a patient was also identified as an important factor for identifying a deteriorating paediatric patient. A "gut feeling" was described as both a reaction to patient signs and a feeling based on the nurse's intuition gained through experience. The signs or symptoms that would trigger this "gut feeling" were not identified.

KEYWORDS

clinical deterioration, early recognition, nurse intuition, nursing concern, pediatric nursing

1 | INTRODUCTION

The early recognition and treatment of critically ill children and young people are key aspects of clinical paediatrics. Paediatric track and trigger tools (PTTT) provide a framework for routine bedside observations that can alert healthcare professionals to hospitalized paediatric patients at risk of condition deterioration (Lambert et al., 2017). Research has indicated that nurses' clinical impressions are important in assessing a paediatric patient's condition

(Gawronski et al., 2018; Zachariasse et al., 2017). Even though the components, number of included parameters, and scoring strategies vary widely in the different PTTTs, all PTTTs rely heavily on vital signs (Chapman et al., 2016; Lambert et al., 2017), whilst only a few include staff concerns (McLellan et al., 2017). However, incorporating staff concerns only as a checkbox does not incorporate nurses' descriptions of their specific concerns. Qualitative studies have highlighted the need to find a way to integrate clinical judgment into PTTTs (Bonafide et al., 2013; Jensen et al., 2018).

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2 | BACKGROUND

Recognizing the development of critical illness at an early stage and differentiating it from minor illnesses can be challenging. Many hospitalized children will exhibit signs of a critical illness but will stabilize and be treated and discharged without declining (Jensen, Kirkegaard, et al., 2019; Jensen, Olesen, et al., 2019). Some children, however, will need additional treatment and further monitoring because of signs of deterioration, which are the worsening of a patient's state or a gradual decline (Jensen, Kirkegaard, et al., 2019; Jensen, Olesen, et al., 2019; National Institute for Health Clinical Excellence, 2007). Nurses are placed in a unique position to identify the signs of deterioration in children and to respond appropriately (Massey et al., 2016). Changes in vital signs and behaviour indicating a decline in a patient's condition may be present 24 hr prior to an adverse event (McLellan et al., 2017; Pearson, 2008; Robson et al., 2013). Nurses' bedside observations are essential for identifying clinical deterioration (Massey et al., 2016). Although attention has been given to the observation of paediatric patients (Lambert et al., 2017) and national guidelines on PTTTs have been published in Ireland (Department of Health, 2016) Scotland (Health Improvement Scotland, 2021) and Norway (PedSAFE, 2021), the unacknowledged clinical deterioration of hospitalized paediatric patients remains a problem (Chapman et al., 2016; Jensen, Kirkegaard, et al., 2019). A 2008 review of 89 hospital paediatric deaths indicated that in 70% of the cases, some factors that led to these deaths, including failure to recognize and respond to clinical deterioration, could have been avoided (Pearson, 2008). A 2013 review of 3,857 paediatric deaths found that 21% could have been prevented (Wolfe et al., 2014).

2.1 | Paediatric patients: the challenges

Healthcare professionals' ability to detect the deterioration of a child's condition is significant because children's physiological responses to illness are distinctly different from those of adults (Resuscitation Council, 2016). In contrast to adults, children have compensatory mechanisms that can mask the indicators of deterioration. They can, for example, maintain almost normal blood pressure despite a considerable loss of fluid. However, when they can no longer compensate, children can rapidly become critically ill. This situation is further complicated because depending on their age and cognitive ability, paediatric patients are often unable to articulate how or what they are feeling (Mecham, 2010). Furthermore, children have unique age-specific physiological response patterns to illness (Lambert et al., 2017). Because of these factors, paediatric patients are at an increased risk of unrecognized clinical deterioration (Mecham, 2010). Not including intensive care units, 8%–14% of cardiac arrests involve paediatric patients (Nowak & Brill, 2007), for whom the survival rate is only 15%–33%; for survivors, the likelihood of a poor neurological outcome is 35% (Robson et al., 2013). It is important to acknowledge and act on the often discreet signs of acute and critical illness in children. Because paediatric nurses are around the patient 24 hr, their

role is essential in identifying patients, here using structured bedside observations and their intuition to intervene early, potentially preventing further decline (Gawronski et al., 2018).

2.2 | Paediatric track and trigger tools

Patient safety initiatives, such as paediatric early warning systems, which aim to monitor, detect and respond to signs of clinical deterioration in hospitalized paediatric patients, have been developed (Jensen, Olesen, et al., 2019). Such systems include "track and trigger" tools that provide a framework for routine bedside observations. In the current paper, the tools are referred to as PTTTs, which alert healthcare professionals of hospitalized paediatric patients at risk of condition deterioration (Chapman et al., 2010) and that are designed to help staff identify the early signs of critical illness and onset of deterioration to facilitate a prompt treatment response (Chapman et al., 2016) and help determine their clinical condition. The PTTTs provide healthcare professionals with an aggregate score that is often based on physiological parameters, including respiratory rate, respiratory effort, oxygen saturation, systolic blood pressure, pulse rate and level of consciousness (Lambert et al., 2017). When a child's clinical condition deteriorates, deviation from normal vital signs results in an increased score, indicating that interventions may be required; corresponding actions and observation levels are outlined in supportive algorithms and clinical decision support tools (Jensen, Olesen, et al., 2019). Therefore, PTTTs are a systematic assessment of primarily vital signs and other observations such as observation of respiratory work, level of consciousness, and non-physiological parameters such as oxygen therapy. PTTTs are multidisciplinary tools used by both nurses and medical doctors and have been documented to improve multidisciplinary teamwork and communication (Lambert et al., 2017). However, recent reviews do not agree on which PTTT to implement or what parameters PTTTs should include (Chapman, 2017b; Lambert et al., 2017). Although a wide range of PTTTs exist, evidence of their effectiveness is still limited (Lambert et al., 2017). The components, number of included parameters and scoring strategies vary widely in the different PTTTs. All PTTTs rely heavily on vital signs (Chapman, 2017b; Lambert et al., 2017), whilst only some include staff concerns (McLellan et al., 2017). However, incorporating staff concerns only as a checkbox does not incorporate nurses' descriptions of their specific concerns.

2.3 | Paediatric track and trigger tools and individual clinical assessments

PTTTs do not distinguish among different diagnoses or individual patient characteristics, which comes with the risk of overlooking children without a normal stress response or with permanently impaired physiology resulting from a chronic disease (Chapman et al., 2017). Children with expected abnormal vital signs frequently undergo unnecessary clinical assessments, often resulting

in an increased workload, which has been documented as a reason for not conducting PTTT observations or complying with PTTT protocols (Jensen et al., 2018). Furthermore, PTTTs do not allow much room for individual clinical assessment. Studies on adults have documented that nurses often use intuition to recognize patients whose condition is deteriorating (Douw et al., 2015, 2016). Benner et al. defined intuition as “a judgment without a rationale, a direct apprehension and response without recourse to calculative rationality” (Benner et al., 2008p.208). The nurse's role in caring for clinically deteriorating children has been studied in various contexts. A study on nurses' roles in the first assessment of children in the emergency department concluded that nurses' clinical impressions alone could not be used to predict severe illness in paediatric patients but that they did provide additional information to the objective predictors (Zachariasse et al., 2017). Gawronski et al. (2018) studied the factors influencing the escalation of care for hospitalized children with deteriorating conditions, finding that staff relied on their clinical judgment, even though they found PTTTs to be a useful screening tool for identifying clinical changes. PTTTs that supplement vital signs with nurses' clinical assessments, allowing the addition of specific clinical characteristics or signs that trigger their concern, could address some of these challenges.

Studies on adults have shown that identifying and adding signs that trigger nurses' concerns about a patient's condition improved outcomes when integrated into an early warning score (Douw et al., 2016, 2017); however, this has not been studied in a paediatric population. Research has indicated that nurses' clinical impressions are important in assessing a paediatric patient's condition (Gawronski et al., 2018; Zachariasse et al., 2017). Systematic and scoping reviews of PTTTs have focused on performance and nurses' use of these tools (Chapman et al., 2010; Lambert et al., 2017; Wood et al., 2019).

Hence, there is a lack of knowledge about the signs and symptoms other than vital signs that trigger nurses' concerns for paediatric patients at risk of clinical deterioration (Jensen et al., 2018). It is unclear which signs and symptoms trigger nurses' concerns about paediatric patients and whether adding these signs as a parameter to PTTTs would improve their ability to detect children with conditions that could lead to deterioration (Jensen et al., 2018). Clarification could help nurses put their intuition into words, help them take action based on their intuition and obtain medical support for paediatric patients in an early stage of deterioration, as has been documented in early warning scores for adult patients (Douw et al., 2017). No reviews on this important part of nursing care have been published. Therefore, a scoping review is necessary to explore the literature on this subject.

3 | AIM

The aim of the present scoping review was to identify and map the signs and symptoms, apart from vital signs, that trigger nurses'

concerns about the deteriorating conditions of hospitalized paediatric patients (up to 18 years of age).

4 | REVIEW QUESTION

What are the signs and symptoms, apart from vital signs, that trigger nurses' concerns about the deteriorating conditions of hospitalized paediatric patients (up to 18 years of age)?

5 | METHODS

5.1 | Study design

The present scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews (Peters et al., 2020) and with an a priori protocol (Jensen et al., 2020). Following the JBI methodology for scoping reviews ensured meeting international standards and transparency of methods used.

5.2 | Inclusion criteria

5.2.1 | Populations

This review considered studies that included registered nurses (alone or together with other health care professionals)—regardless of age, sex and duration of their nursing career—who had graduated from a Bachelor of Nursing program and who worked in hospital settings with paediatric patients.

5.2.2 | Concept

The concepts studied in the current scoping review were the signs and symptoms that trigger nurses' concern about a paediatric patient's condition. This review considered studies that investigated the signs and symptoms that triggered nurses' concerns in the early recognition stage (the period during which there are observable features before the seriousness of the condition is recognized) of deteriorating paediatric patients. There were no limitations in relation to the paediatric patients' clinical conditions or age as many paediatric departments have hospitalized children aged 0–18 years with varying diagnoses and clinical issues.

5.2.3 | Context

This scoping review considered studies that included acute hospitals in all geographic locations in which nurses care for paediatric patients in all geographic locations.

5.2.4 | Types of sources

This scoping review considered for inclusion both experimental and quasi-experimental study designs, including randomized controlled trials, nonrandomized controlled trials, before-and-after studies and interrupted time-series studies. In addition, analytical observational studies, including prospective and retrospective cohort studies, case-control studies, and analytical cross-sectional studies, were considered for inclusion. This scoping review also considered descriptive observational study designs, including case series, individual case reports and descriptive cross-sectional studies.

Qualitative studies were also considered but only if they focused on qualitative data that included, but were not limited to, designs such as phenomenology, grounded theory, ethnography, qualitative description and action research. In addition, reviews that met the inclusion criteria were also considered. The reference lists of the papers included in the review were screened for primary articles.

Studies published in English, Norwegian, Swedish or Danish that met the inclusion criteria were included in the review. The specific signs and symptoms triggering nurses to become concerned about a paediatric patient's condition were translated into English and followed recommendations from reporting qualitative data (van Nes et al., 2010). Studies were not restricted by date to enable the widest possible evidence to be mapped.

5.3 | Search strategy

A preliminary search was conducted in the following databases: PROSPERO, MEDLINE (via PubMed), the Cochrane Database of Systematic Reviews, and the JBI Database of Systematic Reviews and Implementation Reports. No current or planned systematic reviews on the topic were identified.

The search strategy aimed to locate both published and unpublished primary studies and reviews. An initial limited search of MEDLINE (via PubMed) and CINAHL (via EBSCO) was performed to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles and the index terms used to describe the articles were used to develop a full search strategy. The search strategy—including all identified keywords and index terms—was adapted according to each included information source. A research librarian was involved in designing and refining the search. The full search strategies are provided in Supplementary Table S1.

5.3.1 | Information sources

The databases searched were MEDLINE (via PubMed), CINAHL (via EBSCO), Embase (via Ovid), Scopus (via Elsevier) and Swemed (via Karolinska Institute). The search for unpublished PhD dissertations was performed using ProQuest Dissertations and Theses.

5.4 | Study selection

All the identified records were collated and uploaded into EndNote version X9.2 (Clarivate Analytics, PA, USA), and duplicates were removed. The titles and abstracts were screened by two independent reviewers for assessment against the inclusion criteria (See Figure 1). Potentially relevant studies were retrieved in full, and their citation details were imported into the covidence systematic review software (Veritas Health Innovation, Melbourne, Australia). Full-text papers that did not meet the inclusion criteria were excluded, and the reasons for their exclusion are provided in Supplementary Table S2. Any disagreements that arose between the reviewers at any stage were resolved through discussion.

5.5 | Data extraction

Data were extracted from the papers included in the scoping review by two independent reviewers using a data extraction tool developed by the reviewers (Jensen et al., 2020). The extracted data included specific details about the population, concept, context, methods, and key findings relevant to the review question.

5.6 | Data presentation

The search results and article selection are presented in a flowchart following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009) (Figure 1). The results are described in detail in the following section. The characteristics of the included studies are presented in tabular form in a manner that aligns with the scoping review's objectives and guidelines (Peters et al., 2020).

5.7 | Ethics

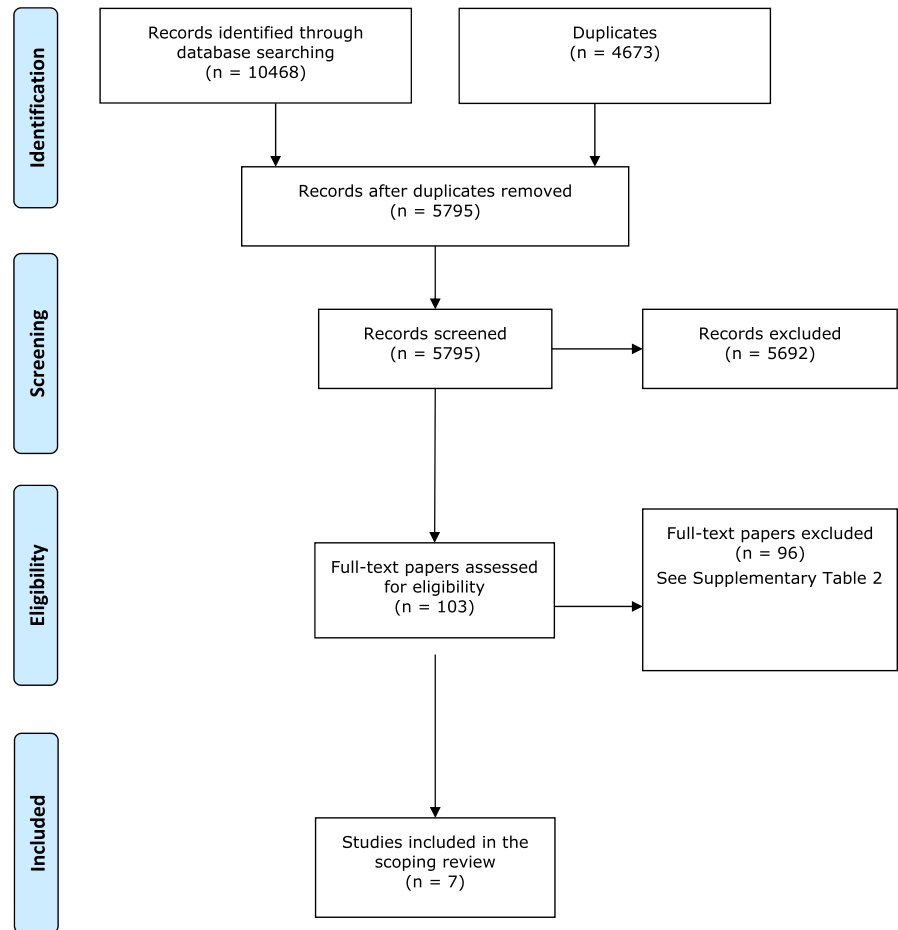
Because this was a scoping review, ethical approval was not required.

6 | RESULTS

6.1 | Study inclusion

A total of 5,795 citations were identified after duplicates were removed. After screening the titles and abstracts, 5,692 citations were excluded, and 103 citations were considered for full-text examination. As a result of the full-text examination, another 96 citations were excluded, yielding seven citations to be included in the scoping review (see Figure 1). The main reasons for excluding the studies were as follows: 1) They did not describe signs and symptoms that trigger nurses' concerns or were unrelated to the topic ($n = 69$), or 2) only conference abstracts were available ($n = 18$). Regarding the

FIGURE 1 Search results and study selection and inclusion process



conference abstracts, a search was made for any published papers, but none were found. The data extracted from the seven citations are presented in Supplementary Table S3. The 96 citations excluded following the full-text screening and the reasons for exclusion are reported in Supplementary Table S2. Screening of the reference lists did not yield any new citations.

6.2 | Characteristics of the included studies

Of the seven included studies, all of which were published in English, three were doctoral theses (Chapman, 2017a; Etheredge & Hyman, 1989; Rubarth & Reed, 2005). Six used a qualitative design to collect data, as follows: Semi-structured interviews (Bowen et al., 2017); focus group interviews (Brady & Goldenhar, 2014; Chapman, 2017a; Gawronski et al., 2018; Jensen et al., 2018); and interviews and observations (Etheredge & Hyman, 1989). The qualitative studies reported using a thematic analysis (Bowen et al., 2017; Gawronski et al., 2018), content analysis (Etheredge & Hyman, 1989), a constant comparison approach (Brady & Goldenhar, 2014), framework analysis (Chapman, 2017a) and qualitative meaning condensation (Jensen et al., 2018), although the specific theoretical position was not reported. One study reported using a prospective correlational design; however, the data from that study were analysed using a qualitative content analysis (Rubarth & Reed, 2005).

The seven research studies were conducted in four countries: three in the United States (Brady & Goldenhar, 2014; Etheredge & Hyman, 1989; Rubarth & Reed, 2005), two in the United Kingdom (Bowen et al., 2017; Chapman, 2017a), one in Italy (Gawronski et al., 2018) and one in Denmark (Jensen et al., 2018). The years of publication ranged from 1989–2018, with most studies being published between 2014–2018. Supplementary Table S3 presents the study characteristics.

6.2.1 | Study population

Nurses were the informants in all the included studies. In three studies, nurses were the only informants (Etheredge & Hyman, 1989; Jensen et al., 2018; Rubarth & Reed, 2005), and in the other studies, other healthcare professionals such as paediatricians, in addition to the nurses, participated. However, the extracted findings presented in the current review all represent the nurses' perspectives. The nurses' experience ranged from 1–20 years.

6.2.2 | Patients' ages and conditions

Two studies reported a specific age group: Bowen et al. (2017) included children under 5 years of age with respiratory illness, and

Rubarth and Reed (2005) included newborns with sepsis. These two were also the only studies that reported a specific condition for the included patient group. The other studies were described as having been performed in either an in-patient paediatric department (Jensen et al., 2018) or paediatric hospital (Bowen et al., 2017; Brady & Goldenhar, 2014; Chapman, 2017a; Etheredge & Hyman, 1989; Gawronski et al., 2018), with Etheredge and Hyman (1989), Bowen et al. (2017), and Rubarth and Reed (2005) specifying that their studies were performed in a critical care unit, a paediatric emergency department, and neonatal intensive care unit, respectively (see Supplementary Table S3).

6.3 | Review findings

Based on the JBI scoping review guidelines for outlining and summarizing the main findings, the results are presented as a narrative summary, with tables to support the data, where appropriate (Peters et al., 2020). The summary is presented to reflect the objective proposed for this review: characteristics of the signs and symptoms, apart from vital signs, that trigger nurses' concerns.

6.3.1 | Characteristics of the signs and symptoms that trigger nurses' concerns

When describing the signs and symptoms underlying nurses' concerns, all the included studies mentioned the nurse's gut feeling that something was wrong with the patient. An intuitive or gut feeling

when seeing a patient was mentioned as an important factor in detecting a deteriorating paediatric patient. This gut feeling was described with various terms, as in the following examples: "It is the feeling that something is not quite right with the patient" (Etheredge & Hyman, 1989p.50); "The more experience I gain, the more I use my gut and use gut feeling frequently in conjunction with exam and vital signs" (Rubarth & Reed, 2005p.125); or "I feel that the use of 'intuition' is really that the nurse is unable to describe the physical finding that exists" (Rubarth & Reed, 2005 p.125). This gut feeling was described as both a reaction to signs from the patients and as a feeling based on the nurses' own intuition gained through experience. More objective observations that would trigger the nurses' concerns were also described in two studies (Bowen et al., 2017; Gawronski et al., 2018). These included behavioural clues that could provide nurses with information about the illness severity, for example, "... 'Ooh, I think he's very sleepy, I'll do a set of obs' ..." (Chapman, 2017a p.261) or changes in pain or the child's colour, for example, "...a colour that changes, pain that worsens, even visually" (Gawronski et al., 2018 p.5) (see Table 1).

7 | DISCUSSION

Vital signs are not the only factors that trigger nurses' concerns (Odell et al., 2009). Up to 16% of clinical deterioration events can be linked to a delay in recognition of the child's critical condition (Hayes et al., 2012). In the current scoping review, we included seven studies that used a qualitative method, and this limited number of studies nevertheless offers some insights into the signs and

TABLE 1 Key findings

Characteristics of the signs and symptoms that trigger nurses' concern	
Pain	<ul style="list-style-type: none"> • Pain that worsens (Gawronski et al., 2018)
Colour	<ul style="list-style-type: none"> • Colour that changes (Gawronski et al., 2018) • Pale, becoming ashen or mottled (Bowen et al., 2017)
Behaviour	<ul style="list-style-type: none"> • Age-appropriate interaction with caregivers and clinicians (Bowen et al., 2017) • Playing (Bowen et al., 2017) • Unwillingness of children to interact normally (Bowen et al., 2017)
Intuition or "gut feeling"	<ul style="list-style-type: none"> • Gut feeling when they see the patient deteriorate (Brady & Goldenhar, 2014) • Intuition and patient observations were the primary factors for detecting a deteriorating child (Gawronski et al., 2018) • Sensory impressions (seeing, hearing and touching) were part of gut feeling (Etheredge & Hyman, 1989; Jensen et al., 2018) • A feeling that something is not right with the patient (Bowen et al., 2017; Etheredge & Hyman, 1989) • Being unable to describe the physical finding that exists (Rubarth & Reed, 2005) • A "gut instinct" that some children were deteriorating, despite a low PTTS score (Chapman, 2017b)

Abbreviation: PTTS, paediatric track and trigger systems.

symptoms—apart from vital signs—that trigger nurses' concern about the clinical deterioration of paediatric patients. We identified a few signs and symptoms—including a change in a patient's colour, changes in pain levels, and if a child does not play or interact accordingly to his or her age—that would trigger nurses to be concerned. Some PTTT has incorporated registration of skin colour—one of them is the Cardiff and Vale PEWS (Edwards et al., 2009) which was one of the three best performing PTTT in a review comparing the predictive performance of 18 PEWS in predicting critical deterioration (Chapman et al., 2017) whilst other of the sign and symptoms identified in this review are not present in a PTTT. These signs could prove to be important early signs in the process of the clinical deterioration of paediatric patients, helping nurses recognize paediatric patients at risk of clinical deterioration.

Another key finding of the present review revolves around the gut feeling of nurses. A gut feeling in and of itself is not a sign or symptom, but it plays an important role in relation to identifying paediatric patients at risk of clinical deterioration and is highlighted in several studies (Bowen et al., 2017; Chapman, 2017a; Gawronski et al., 2018; Kaul et al., 2014). Gut feelings or concerns play a pivotal role and, thus, are also part of this review, even though a gut feeling is unspecific and nurses seem to have difficulties in putting words on what signs and symptoms that trigger their gut feeling that something is wrong with the patient. It is possible that gut feelings cannot be directly taught because they arise from experience; however, if experienced nurses make their intuitive judgements explicit, this may support inexperienced nurses whilst also expanding the experienced nurses' knowledge and improving patient care. Benner et al. (2009) highlighted the situation of knowing that something is wrong without being able to articulate a rationale for the concern about a patient's condition, arguing that diagnosis models or theories do not provide a complete picture when experienced nurses respond to caring situations because practical knowledge gained from years of working experience is also of importance.

Because few studies have examined which specific signs and symptoms—apart from vital signs—trigger nurses' concern about a paediatric patient's clinical condition, these signs and symptoms remain undefined and, thus, cannot be used to assist nurses in acting on their intuitive feelings. One possible explanation is that putting intuition into words seems to be difficult for nurses (Douw et al., 2015), with more experienced nurses appearing to be more confident in doing so (Melin-Johansson et al., 2017). It has been argued that intuition is an essential part of clinical judgement. However, Benner et al. (2008) and Hams (2000) have described how the nursing profession does not seem to have a language to articulate this. Nurses' inability to articulate their observations and the signs triggering concern for patients may also have an impact on cooperation with other healthcare professionals (Jensen et al., 2018), the development of nursing competencies, and the ability to critically think for experienced nurses (Melin-Johansson et al., 2017). As Melin-Johansson et al. (2017) emphasized, knowledge can only be shared when it is communicated to others. If nurses' observations are not articulated, this information cannot be shared with other colleagues, so nurses

cannot analyse and critically reflect on their observations. The lack of clinical language might also have an impact on patient safety. Douw et al. (2016) demonstrated how indicators of sign and symptoms indicate nursing "worry" in adult patients-supported nurses communicating their intuitive feeling, increased confidence in the decision-making process and improved patient outcomes. Notably, this reluctance among nurses to share their intuitive experience with colleagues has been reported by Melin-Johansson et al. (2017), who argued that this might be because of scepticism towards intuition by other health care professions. Intuition in nursing has been debated and studied for several years; however, there are still areas that need to be explored, as the current review highlights (Hams, 2000; Melin-Johansson et al., 2017). Many scoring systems designed for children, such as PTTTs or triage systems, have been developed (Jensen, Olesen, et al., 2019; Recznik & Simko, 2018; Roland et al., 2017). The element of a gut feeling is relatively unexplored in relation to these scoring systems. It could be interesting to investigate a combined approach to PTTTs that includes both objective criteria, such as vital signs and more subjective criteria, such as the specific signs and symptoms that trigger nurses' concern for the deteriorating paediatric patient.

The present scoping review is the first in a range of studies aiming to improve the performance of PTTTs and their acceptability among healthcare professionals. A Delphi study is also being conducted to identify and describe a classic and anticipated pathological picture of hospitalized children with a high PTTT score but where the staff is not concerned. The results from this scoping review and the Delphi study will be integrated into the PTTT and tested in a prospective cluster-randomized crossover project.

7.1 | Limitations

There are several limitations to the current scoping review. First, despite conducting a systematic, comprehensive and broad search, the number of relevant papers identified was very small. Parents role in the care of children and young people are important as they almost always are hospitalized with at least one close relative. Parents can provide healthcare professionals in-depth knowledge of their child and thus do they also play an important role with regards to signs and symptoms of clinical deterioration. This was not part of this scoping review should be investigated in future studies.

8 | CONCLUSION

The present scoping review aimed to answer the following question: What are the signs and symptoms—apart from vital signs—that trigger nurses' concerns about the deteriorating conditions of hospitalized paediatric patients (up to 18 years of age)? Nurses' intuitions or gut feelings that something is wrong with the patient without being able to articulate a rationale for the feeling seems

to be important for recognizing deteriorating paediatric patients. Changes in the patient's colour and pain and whether a child plays or interacts according to his or her age were also identified as signs that would trigger nurses' concerns about the deteriorating conditions of hospitalized paediatric patients. These signs could prove to be important early signs in the process of the clinical deterioration of paediatric patients and could help less-experienced nurses recognize paediatric patients who are at risk of clinical deterioration. This would improve nursing practice by highlighting the important signs of clinical deterioration and allow experienced nurses to take action based on their gut feelings and improve communication. Because the literature is sparse in this area of paediatric nursing, further studies are required.

8.1 | Recommendations for research

The lack of studies focusing on the signs and symptoms triggering nurses' concerns about the deteriorating conditions of hospitalized paediatric patients reinforces the need for further research in this significant field. First, internationally qualitative studies to obtain in-depth knowledge in this key area are recommended. After the signs and symptoms that trigger nurses' concern about the deteriorating conditions of hospitalized paediatric patients are identified and mapped in future studies, it would also be of value to determine the role played by these signs underlying nurses' concerns as early indicators of clinical deterioration. We recommend that this will be investigated in prospective randomized studies comparing PTTTs with and without indicators of nurses' concerns about the deteriorating conditions of hospitalized paediatric patients.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

All authors have approved the manuscript and made substantial contributions to: Conception and design, or acquisition of data or analysis and interpretation of data. Drafting the manuscript or revising it critically for important intellectual content.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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