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Review Article

Nursing practices in children with sepsis in urgent and emergency services: a scoping review*

Práticas de enfermagem em crianças com sepse nos serviços de urgência e emergência: revisão de escopo

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ABSTRACT
Objective: to map nursing practices for children with sepsis in urgent care and emergency departments. **Methods:** a scoping review was conducted in the following databases: MEDLINE/PubMed, EMBASE, CINAHL, SCOPUS, Web of Science, LILACS, SciELO, Cochrane, and gray literature: Google Scholar, ProQuest Dissertations & Theses, the Theses and Dissertations Catalog, and the Brazilian Digital Library of Theses and Dissertations. Publications from 2019 to 2025 were included and selected by two reviewers. **Results:** of the 6,155 studies identified, 11 were included in the sample. Technology-based and cross-sectional studies predominated (n=3; 27%), and were published in 2019 (n=3; 27%). In urgent and emergency care settings, nursing practices included direct care (n=3; 27%), involving early recognition of clinical deterioration, monitoring, vascular access, and the administration of antimicrobials and fluids; professional education (n=4; 36%), using virtual reality, simulation, and educational technologies; and management (n=4; 36%), involving triage tools, alert systems, and care protocols. **Conclusion:** the evidence indicates that nursing practices focus on surveillance, timely treatment, professional training, and management of care for children with sepsis in urgent and emergency care settings. **Contributions to practice:** these findings can inform team training and the implementation of protocols for recognizing and managing pediatric sepsis in these settings.
Descriptors: Nursing Care; Sepsis; Pediatric Nursing; Emergency Nursing; Scoping Review.

RESUMO
Objetivo: mapear as práticas de enfermagem em crianças com sepse nos serviços de urgência e emergência. **Métodos:** revisão de escopo realizada nas bases: MEDLINE/PubMed, EMBASE, CINAHL, SCOPUS, *Web of Science*, LILACS, SciELO, Cochrane e literatura cinzenta: *Google Scholar, ProQuest Dissertations & Theses*, Catálogo de Teses e Dissertações e Biblioteca Digital Brasileira de Teses e Dissertações. Incluíram-se publicações de 2019 a 2025, selecionadas por dois revisores. **Resultados:** dos 6.155 estudos identificados, 11 compuseram a amostra. Predominaram produções tecnológicas e estudos transversais (n=3; 27%), publicados em 2019 (n=3; 27%). Nos serviços de urgência e emergência, as práticas de enfermagem incluíram assistência direta (n=3; 27%), com reconhecimento precoce da deterioração clínica, monitorização, acesso vascular e administração de antimicrobianos e fluidos; educação profissional (n=4; 36%), com realidade virtual, simulação e tecnologias educacionais; e gerenciamento (n=4; 36%), com ferramentas de triagem, sistemas de alerta e protocolos assistenciais. **Conclusão:** as evidências indicam que as práticas de enfermagem se concentram na vigilância, tratamento oportuno, capacitação profissional e gerenciamento do cuidado à criança com sepse nos serviços de urgência e emergência. **Contribuições para a prática:** os achados podem subsidiar a capacitação das equipes e a implementação de protocolos para reconhecimento e manejo da sepse pediátrica nesses serviços.
Descritores: Cuidados de Enfermagem; Sepse; Enfermagem Pediátrica; Enfermagem em Emergência; Revisão de Escopo.

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Introduction

Sepsis is a serious clinical condition characterized by organ dysfunction resulting from the body's dysregulated response to an infectious process[1]. In the pediatric population, it is estimated that approximately 25 million cases of sepsis occur annually, resulting in about three million deaths worldwide[2-3]. Mortality is influenced by factors intrinsic to the child, the causative agent, and the environment, with a greater impact in low- and middle-income settings[4]. In these settings, sepsis and other severe infections remain among the leading causes of childhood death[3].

The impact of the syndrome on the pediatric population is also related to delayed recognition and inadequate treatment[3-4]. In sepsis, early identification and understanding of its specific characteristics are essential for implementing prevention strategies, improving care, and effectively managing the syndrome[5]. Considering these needs, organizations such as the Society of Critical Care Medicine, the Surviving Sepsis Campaign, and the Latin American Sepsis Institute have developed recommendations for case management, covering diagnostic evaluation, antimicrobial treatment, and volume resuscitation, among other interventions[6].

Despite advances in treatment, identifying sepsis in children remains a challenge, particularly in urgent care and emergency departments, which are not exclusively dedicated to pediatric care. In these settings, patients are often cared for by professionals without experience in pediatrics or ongoing training[3]. Furthermore, the lack of diagnostic tools capable of distinguishing children with infectious conditions that may progress to sepsis hinders the clinical practice of healthcare professionals[7].

The evaluation of children with suspected sepsis in pediatric urgent and emergency care settings requires constant monitoring and decision-making[8], as early diagnosis may represent the best opportunity to initiate treatment[2,8-9]. Given this reality, the nursing team is frequently among the first professionals to assess these children, playing a fundamental role in identifying clinical changes and implementing timely interventions[1,10].

However, although recommendations exist for the management of children with sepsis, nursing practices in urgent and emergency care settings have not yet been comprehensively systematized in the literature. Given the importance of nursing in the recognition and management of the syndrome[8], mapping these practices can contribute to organizing available knowledge, strengthening care for children with sepsis, and supporting the implementation of evidence-based strategies. A preliminary literature search did not identify studies with similar objectives, highlighting a gap in the systematization of these practices within this care context.

Thus, this study aimed to map nursing practices for children with sepsis in urgent care and emergency departments.

Methods

Study type

This is a scoping review conducted in accordance with JBI recommendations[11-12]. The research protocol was registered on the Open Science Framework (OSF) platform (https://doi.org/10.17605/OSF.IO/UFD4W). The process was structured into distinct stages, including the definition of the objectives and research question, the eligibility criteria, the identification, and selection of evidence, the data extraction and analysis, and the presentation and synthesis of the results[11].

Research question

The research question was formulated using the PCC (Population, Concept, and Context) mnemonic strategy[11]. In this study, it was defined as follows: Population (P) – pediatric patients with sepsis; Concept (C) – nursing practices; and Context (C) – pediatric ur-

gent and emergency care services. Thus, the guiding question was defined as follows: What is the scientific evidence regarding nursing practices for children with sepsis in urgent and emergency care services?

Search strategy

The search protocol, which defined the databases and search strategies, was developed by the principal investigator based on the research question and validated by a librarian with experience in conducting searches in health-related databases. Studies were selected using controlled terms identified in the Descriptors in Health Sciences (DeCS) and Medical Subject Headings (MeSH), defined as: nursing care (Atención de Enfermería, Nursing Care); Sepsis (Sepsis, sepsis); Septic shock (choque séptico, septic shock); Pediatric nursing (enfermería pediátrica; pediatric nursing); Emergency nursing (enfermería de urgencia, emergency nursing); Emergency medical services (servicios médicos de urgencia, emergency medical services).

The terms were combined using the Boolean operators AND and OR, with specific adaptations according to the syntax of each database. In the MEDLINE database, the search strategy used was: ("Nursing Care"[Mesh] OR "Nursing Care" OR "Nursing"[Mesh] OR "Nursing" OR "Nursings" OR "Nurses"[Mesh] OR "Nurses" OR "Nurse") AND ("Sepsis"[Mesh] OR "Sepsis" OR 'Septicemia' OR "Shock, Septic"[Mesh] OR "Septic Shock" OR "Systemic Inflammatory Response Syndrome"[Mesh] OR "Systemic Inflammatory Response Syndrome") AND ("Child"[Mesh] OR "child" OR "children" OR "childhood" OR "Child, Preschool"[Mesh] OR "preschool" OR "preschools" OR "infancy" OR "Infant"[Mesh] OR "infant" OR "infants" OR "Pediatrics"[Mesh] OR "Pediatrics" OR "Neonatology"[Mesh] OR "Neonatology") AND ("Emergencies"[Mesh] OR "Emergencies" OR "Emergency" OR "urgency" OR "Emergency Nursing"[Mesh] OR "Emergency Nursing" OR "Emergency Medicine"[Mesh] OR "Emergency Medicine" OR "Emergency Medical Services"[Mesh] OR "Emergency Medical Services" OR "Emergency Treatment"[Mesh] OR "Emergency Treatment").

Databases and information sources

The database search was conducted in February 2025 through the journal portal of the Coordination for the Improvement of Higher Education Personnel (CAPES), via the Federated Academic Community (CAFe). The following databases were included: Medical Literature Analysis and Retrieval System Online (MEDLINE) via PubMed; Excerpta Medica Database (EMBASE); Cumulative Index to Nursing and Allied Health Literature (CINAHL); Cochrane Library; SCOPUS; Web of Science; Latin American and Caribbean Health Sciences Literature (LILACS); Nursing Database (BDENF); Scientific Electronic Library Online (SciELO).

The search for gray literature was conducted using Google Scholar, ProQuest Dissertations & Theses Global (PQDT Global), the Thesis and Dissertation Catalog of the Coordination for the Improvement of Higher Education Personnel (CAPES), and the Brazilian Digital Library of Theses and Dissertations (BDTD). In addition, guidelines related to sepsis in the pediatric population and institutional websites identified via the Google search engine were consulted.

Eligibility criteria

Studies that addressed the research question, were published in full, were freely accessible online, and were written in English, Portuguese, or Spanish between 2019 and 2025 were included as eligible studies. This included primary studies, reviews, dissertations and theses, technical reports, and institutional documents. Opinion pieces, editorials, letters to the editor, blog posts, and monographs were excluded. It is worth noting that the time frame adopted allowed for the inclusion of evidence produced during the period when treatment guidelines for pediatric sepsis were being updated. Furthermore, this enabled the identification of practices aligned with current recom-

mendations for the recognition, diagnosis, and management of the syndrome, including recent advances in the definition and diagnostic criteria, such as the Phoenix Sepsis Score[13-14].

Selection of evidence sources

Two reviewers conducted the double-blind study selection process, applying the eligibility criteria defined for the study. The results obtained from the search platforms were exported to the Rayyan® reference manager, through which duplicate studies were excluded. Next, the titles and abstracts of the publications were analyzed, and studies that met the inclusion criteria were selected for full-text review.

The studies were identified by an alphanumeric code consisting of a letter and an Arabic numeral. The selected publications were analyzed according to JBI recommendations, and the process was described using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart[15]. Disagreements among the reviewers were resolved by consensus, and the involvement of a third reviewer was not necessary. It is worth noting that a reverse search was conducted in the references of the eligible studies to identify potentially relevant publications to include in the sample.

Data extraction

For data analysis and extraction, the authors developed a tool organized in a spreadsheet using Microsoft Office Excel®, which included the following elements: authors, year of publication, country of origin, database or data source, study type, study objective, level of evidence, and nursing practices.

Levels of evidence

The studies were categorized by level of evidence according to a seven-level hierarchical classification: Level I: Evidence from a systematic review or meta-analysis of all relevant randomized clinical trials (RCTs); Level II: Evidence from well-designed RCTs; Level III: Evidence from well-designed controlled trials without randomization; Level IV: Evidence from well-designed case reports and cohort studies; Level V: Evidence from systematic reviews of descriptive and qualitative studies; Level VI: Evidence from single descriptive or qualitative studies; Level VII: Evidence from expert opinion and/or reports from expert committees[16].

Data analysis and synthesis

Data analysis was conducted using a descriptive approach. The information extracted from the studies was organized and analyzed based on the nursing practices identified in the analyzed studies. Subsequently, these practices were grouped according to similarities in content and purpose, enabling the creation of categories for the synthesis and presentation of the results. During this process, the relationship between the identified practices and the context of pediatric urgent and emergency care services was also considered.

Ethical considerations

Since this is a review study based on public-domain databases and sources, there was no need for review by the Research Ethics Committee. However, the ethical considerations set forth in Law No. 9.610/98 on copyright were taken into account, such as the citation of the authors of the articles included in the sample and the preservation of the ideas, concepts, and findings presented in the studies.

Results

A total of 6,155 studies were identified in the databases, excluding 943 duplicates. After reviewing the titles and abstracts of 5,212 studies and applying the eligibility criteria, 4,923 publications were excluded,

leaving 289 studies. The full texts of the publications were reviewed; of these, 248 were excluded for not addressing the topic and 31 for not involving pediatric emergency departments, resulting in an initial sample of ten studies. A reverse reference search of the selected publications identified one additional study that also met the eligibility criteria, bringing the final sample to 11 studies, as shown in the flowchart (Figure 1).

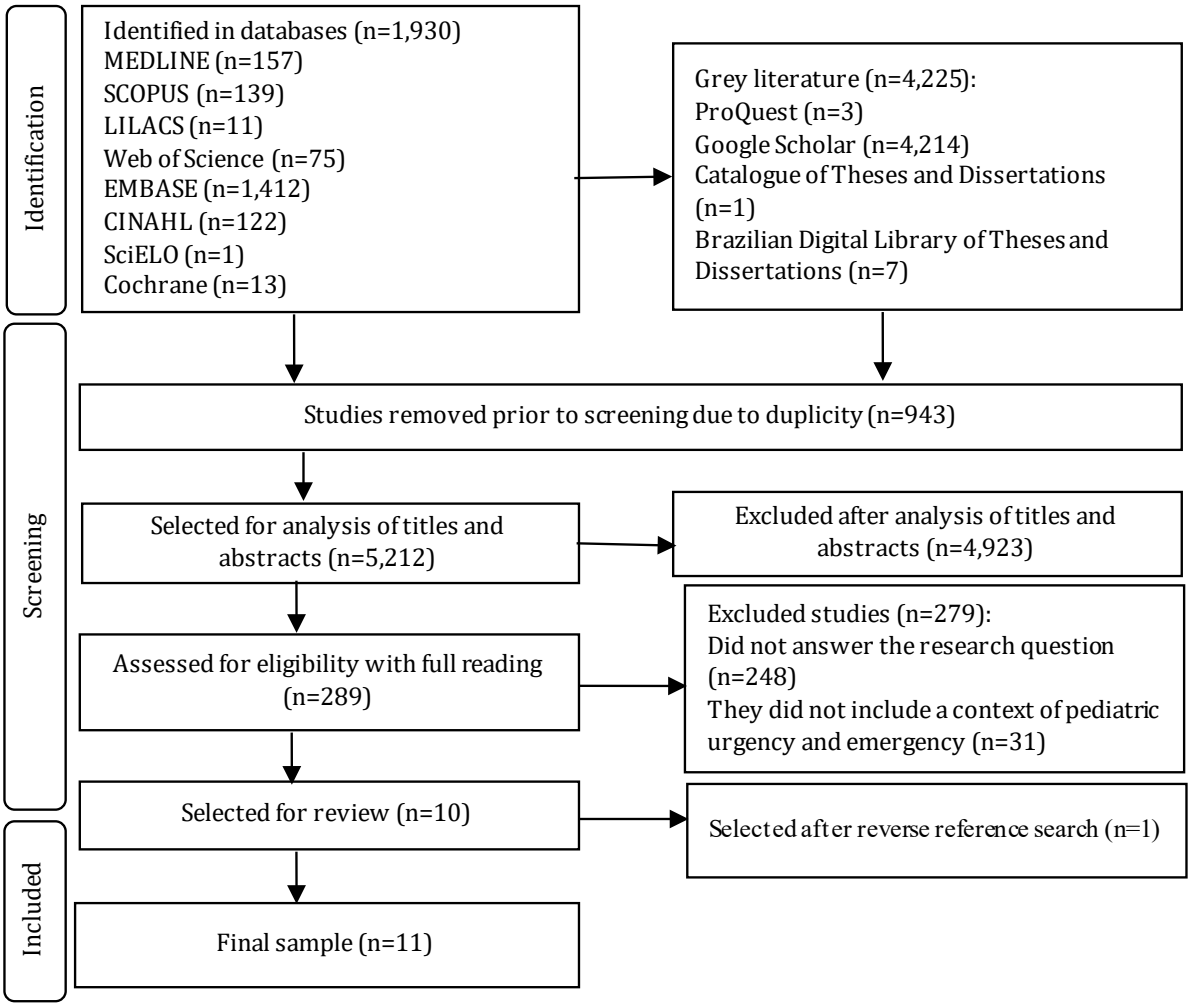

Figure 1 – PRISMA flowchart used for the selection of studies. Florianópolis, SC, Brazil, 2025

Among the studies included in the sample, the highest concentration of publications was observed in 2019 (n = 3; 27%), followed by 2021, 2022, and 2023, with two studies (18%) each. In terms of geographic origin, the majority of the studies came from the United States (n=6; 54%), followed by Australia (n=3; 27%).

Regarding the methodological design and level of evidence of the studies, technology reports and cross-sectional studies stood out, each described in three publications (27%) and classified as level of evidence VI, followed by qualitative and cohort studies, designs that each accounted for two publications (18%), with levels of evidence VI and IV, respectively. Of the 11 included studies, 10 were scientific articles published in indexed journals (n=10; 91%), and one was a technology report from the gray literature (n=1; 9%) (Figure 2).

Study	Author/ Ano	Country / Database	Design/ LE	Main results
A1	Mittal et al[17] 2019	India MEDLINE	Cohort IV	There was a reduction in the time to administer the first dose of antibiotics in children with sepsis after reorganization of the care flow.
A2	Harley et al[18] 2019	Australia EMBASE	Qualitative VI	Nurses' knowledge about sepsis is variable and shows limitations in clinical recognition, care response and understanding of professional attributions.
A3	Emerson et al[19] 2019	United States MEDLINE	Cross-sectional VI	Quality improvement interventions, including *in situ* simulation, reduced time to antibiotic therapy.
A4	Silva[20] 2020	Brazil CAPES	Technological production VI	The educational video proved to be valid as an educational technology, contributing to the improvement of knowledge and support for nursing practice in the management of pediatric septic shock.
A5	Eisenberg; Balamuth[21] 2021	United States MEDLINE	Cohort IV	Variability in pediatric sepsis screening, with the need for standardization of protocols and early identification systems.
A6	Harley et al[22] 2021	Australia MEDLINE	Cross-sectional l VI	Greater knowledge and confidence of professionals after implementation of the clinical route, with improved recognition of sepsis and adherence to recommended practices in emergency care.
A7	Harley et al[8] 2022	Australia EMBASE	Narrative review VI	Early recognition hampered by clinical variability, knowledge gaps, and organizational barriers.
A8	Scott et al[23] 2022	United States MEDLINE	Qualitative VI	Factors that influence pediatric sepsis care in general emergencies include the motivation of professionals, use of guidelines, and institutional processes.
A9	Auerbach et al[24] 2023	United States Canada MEDLINE	Cross-sectional VI	Factors associated with improved pediatric sepsis care include training, standardization of protocols, and organization of services.
A10	Oddiri et al[25] 2023	United States MEDLINE	Technological production VI	An electronic alert system enabled early identification of sepsis in children, contributing to improved clinical recognition.
A11	Zackoff et al[26] 2024	United States MEDLINE	Technological production VI	The simulation program improved the recognition and management of sepsis, in addition to favoring interprofessional work.

Figure 2 – Summary of studies eligible for scoping review (n=11). Florianópolis, SC, Brazil, 2025

Regarding nursing practices for children with sepsis in urgent care and emergency departments, it was found that these were related to nursing care[8,18,23], professional education[19-20,24,26], and care management[17,21-22,25]. In terms of nursing care, the studies highlighted the role of emergency department nurses in the initial response to children with suspected sepsis, including the early identification of clinical changes and signs of deterioration, referral for immediate medical evaluation[18,23], and the implementation of recommended therapeutic measures for managing the syndrome[8,18,23]

Among these measures, the collection of laboratory tests and blood cultures[8], the rapid establishment of intravenous or intraosseous access[23], and the administration of antimicrobials[8,18,23] and fluids[8] were described. Challenges were identified in the early recognition of sepsis in children in emergency departments, stemming from the variability of clinical presentation and the similarity of signs and symptoms to those of other conditions frequently encountered in this setting[8].

In professional education, studies have described strategies aimed at training staff through simulation programs[19,24,26], focusing on the prompt administration of antibiotics[19], improving the quality of pediatric resuscitation in mixed urgent care and emergency departments[24], and interprofessional recognition and management in acute scenarios[26]. An educational video was developed to teach nursing

staff about the early recognition, initial stabilization, and monitoring of children with septic shock in the emergency department[20].

Regarding care management practices, strategies aimed at organizing care processes in urgent and emergency care settings were described[17,21–22,25]. Actions were identified related to reducing the response time between the recognition of sepsis and the administration of the first dose of antimicrobials[17], to the implementation of technologies for the early identification of the syndrome based on vital signs, laboratory tests, and clinical records[21,25], and to the implementation of protocols to guide care from the child's admission to the emergency department [22] (Figure 3).

Dimensions	Nursing practices
Nursing care	Recognition of clinical changes and signs of deterioration[18,23]. Activation of the medical team[18,23]. Obtaining intravenous or intraosseous access[23]. Collection of laboratory tests[8]. Antimicrobial administration[8,18,23]. Volume replacement[8,23]. Constant clinical surveillance[8,18,23].
Professional education	*In situ* simulation of the flow of antibiotic therapy[19]. Educational video about children with septic shock[20]. Simulation of pediatric resuscitation in mixed emergencies[24]. Virtual Reality Simulation for Interprofessional Training[26].
Management	Reduced time to administration of antimicrobials[17]. Screening tools for early identification of sepsis[21,25]. Electronic Warning Systems[25]. Standardized institutional protocols for sepsis[22].

Figure 3 – Synthesis of the nursing practices identified in the studies included for the care of children with sepsis in urgent and emergency services (n=11). Florianópolis, SC, Brazil, 2025

Discussion

It is evident that nursing practices for children with sepsis have focused on three dimensions: direct care, professional education, and care management. Taken together, these indicate that nursing care for children with sepsis in this context involves not only the implementation of clinical interventions but also the training of professionals and the organization of care processes.

In the context of direct care, the findings of this review suggest that early recognition of sepsis in children is the key to implementing the recommended therapeutic measures[8,18,23]. However, despite its importance, this practice remains challenging in urgent and emergency care settings[18,23,27], which are characterized by the need for rapid decision-making regarding potentially critically ill patients, in a context marked by time pressure and the prioritization of patient care[28]. Added to this are pediatric-specific factors, such as physiological, immunological, and developmental variations, which make the presentation of the syndrome heterogeneous and complex in these settings[7,29].

The inherent complexity of evaluating children with sepsis is evident in current diagnostic guidelines. The Phoenix Sepsis Score improves the identification of children with infection associated with organ dysfunction by proposing specific criteria for this population, taking into consideration particularities not addressed in previous definitions. This update reinforces the multifactorial nature of the syndrome and the need for continuous monitoring of clinical and physiological parameters to identify early signs indicative of organ dysfunction[13-14].

In the clinical setting, clinical monitoring is a fundamental part of nursing care for children with sepsis in urgent care and emergency departments[18,20,23]. In these settings, the need for frequent reassessments throughout the course of care requires the team to systematically monitor parameters such as vital signs, tissue perfusion, neurological status, and response to initiated therapy[13,28,30]. The assessment of these para-

meters guides the prompt mobilization of the medical team, the collection of laboratory tests, the establishment of vascular access, and the administration of fluids and antimicrobials[8,18,23].

However, deficiencies in clinical records can compromise healthcare professionals' assessments. A study conducted in U.S. emergency departments found that approximately 49% of children had incomplete vital sign records, with blood pressure being the parameter most frequently missing[31]. Given its importance in identifying cardiovascular dysfunction and septic shock[1], the absence of this data may make it difficult to identify hemodynamic progression toward a more severe condition[1,31].

In addition to the importance of clinical surveillance, the studies reviewed also highlighted professional education as a strategic aspect of care for children with sepsis in emergency departments. The variety of educational technologies identified suggests that professional training has been recognized as an important strategy for improving care in critical care settings[19-20,24,26].

The emphasis placed on professional education underscores that the implementation of recommendations for the management of pediatric sepsis depends not only on the existence of care protocols but also on professionals' ability to apply them in practice[19,24]. In this regard, the identified educational strategies can contribute to the development of knowledge related to the management of the syndrome, thereby helping teams prepare for the care demands of urgent and emergency care services[20,26].

From this perspective, educational technologies stand out for enabling the integrated development of technical and non-technical skills, as well as supporting the implementation of procedures outlined in sepsis care packages[2]. Furthermore, they foster competencies in effective communication, interprofessional collaboration, and clinical reasoning[26,32-34], which are frequently required when managing critical situations. They also enable training in complex scenarios within a safe environment, contributing to greater professional confidence and improved team performance when facing pediatric emergencies[24,26,32-34].

Educational strategies are directly linked to the management of actions recommended in the therapeutic protocol for sepsis. By integrating structured protocols, continuous clinical assessment, and systematic review of work processes, this approach allows the team to reassess the care provided, identify weaknesses, and implement improvements, thereby contributing to greater safety and quality of care[32,35].

The need to integrate technical knowledge with work organization was also observed in studies describing nursing practices related to the management of sepsis in children. The findings indicate that the management of pediatric sepsis goes beyond the implementation of therapeutic interventions and involves the capacity of healthcare services to establish care pathways that support recommended practices[17,21-22,25]. Thus, initiatives aimed at standardizing routines and implementing clinical pathways for sepsis help reduce variability in care and strengthen healthcare professionals' adherence to clinical guidelines[22,36-37].

Similarly, strategies aimed at reducing the time to administer the first dose of antimicrobials[17] and at using triage tools and automated alert systems[21,25] seek to improve the quality of care and minimize organizational barriers. In urgent care and emergency departments, this aspect is particularly important, since the effectiveness of care depends not only on the early recognition of signs of severity but also on the teams' ability to facilitate coordinated clinical interventions[17,22].

In this regard, registry-based alert systems can contribute to greater diagnostic accuracy in sepsis, facilitate communication among teams, and support clinical reasoning[38]. Although technological tools and care protocols assist in the delivery of care, they do not replace clinical judgment; rather, they serve as support to enhance the teams' response capacity[39] in the face of hemodynamic changes observed in children[18].

Among the professionals involved in this process, the nursing team stands out, as their role spans the various dimensions of care for children with sep-

sis in urgent and emergency care settings. In addition to direct care[18,23,30], nurses participate in educational activities[20,22,26], the implementation of care protocols[22], and the coordination of strategies aimed at identifying and managing the syndrome, playing a key role in bridging the gap between the child's clinical needs and the organization of workflows[18,22].

Finally, the analysis of the studies suggests that caring for children with sepsis in urgent and emergency care settings requires the integration of different dimensions of nursing practice. Direct care, professional education, and care management are complementary practices, since the effectiveness of the interventions performed depends on both the professionals' ability to recognize and manage the syndrome[18-19,22] and the organization of care processes that facilitate the delivery of care in critical settings[17,25].

Study limitations

The limitations of this systematic review include the scarcity of specific studies on nursing practices for children with sepsis in urgent care and emergency departments, as well as the often superficial description of nursing interventions in the studies analyzed. Furthermore, there was a predominance of descriptive and exploratory studies, most of which were classified as level VI evidence, in addition to methodological heterogeneity regarding study designs, settings, and objectives. These characteristics must be considered when interpreting the results, as descriptive and observational studies allow for the identification of care practices but have limitations in assessing their effectiveness and establishing causal relationships between nursing practices and clinical outcomes. These aspects may limit the robustness of the evidence and the comparability of findings, reinforcing the need for research that further explores and systematizes nursing practices focused on the care of children with sepsis in emergency departments.

Contributions to practice

This review highlights the importance of nursing practices in the care of children with sepsis in urgent and emergency care settings, particularly those related to clinical monitoring, recognition of severity, professional education, and care management. The findings suggest that strategies focused on professional training, the use of care protocols, and the organization of work processes can contribute to improving care in this context.

Conclusion

The evidence review revealed that nursing practices for children with sepsis in urgent and emergency care settings focus on three dimensions: direct care, professional education, and care management. Among the practices described in the literature, the following stood out: early recognition of signs of clinical deterioration, timely implementation of sepsis care protocols, the use of triage tools and alert systems, as well as professional training through active learning methodologies. The findings suggest that nursing practice spans different stages of care for children with sepsis in these departments, highlighting nurses' involvement in both clinical care and initiatives related to professional development and the organization of care.

Authors' contributions

Conception and design or analysis and interpretation of data: **Lohn A, Nascimento ERP, Nascimento KC**. Drafting the manuscript or providing critical review of the intellectual content; final approval of the version to be published and agreement to be responsible for all aspects of the text to ensure the accuracy and integrity of any part of the manuscript: **Lohn A, Nascimento ERP, Nascimento KC, Malfussi LBH, Moreira AR, Vieira PM, Amaral M.**

Data availability

The authors declare that the data are available in full in the body of the article.

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