



The Analysis Study of Efficacy of Pediatric Emergency Care Protocol: A Comprehensive Systematic Review

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ABSTRACT

Background: Pediatric emergencies require unique protocols to manage critically ill or injured children. Pediatric Emergency Care Protocols (PECPs) aim to standardize assessment, triage, and intervention processes, reducing variability and improving patient outcomes. However, adherence and efficacy vary across healthcare settings, particularly in low-resource environments. A systematic review is crucial for evaluating protocols' effectiveness and adaptability. **Methods:** This systematic review followed PRISMA 2020 guidelines and included only full-text, peer-reviewed articles published in English between 2015 and 2025. Editorials and review papers without a DOI were excluded to ensure source quality. Relevant studies were identified through targeted searches in ScienceDirect, PubMed, and SAGE Publications. **Result:** An initial search across selected databases produced more than 100 potentially relevant studies. Through a structured three-phase screening process, only eight articles satisfied the predetermined inclusion criteria for detailed examination. These selected studies were subjected to rigorous critical appraisal to assess their contribution to understanding the effectiveness of pediatric emergency care protocols. This systematic approach ensured that the final analysis was based on robust evidence aligned with the study's objectives and capable of yielding meaningful insights into this complex area. **Conclusion:** The Pediatric Emergency Care Protocol is a crucial tool in pediatric emergency medicine, ensuring rapid identification and management of life-threatening conditions in children. Its comprehensive disease coverage aligns with international standards, despite challenges like training gaps and limited technology access.

Keywords: pediatric emergency care protocol, clinical protocols, triage and assessment

INTRODUCTION

Pediatric emergencies present unique challenges due to the physiological, anatomical, and developmental differences between children and adults. As such, the management of critically ill or injured children requires distinct protocols that are timely, accurate, and developmentally appropriate.¹ Pediatric Emergency Care Protocols (PECPs) have been developed globally to standardize and optimize the assessment, triage, and intervention processes for children in emergency settings. These protocols aim to reduce variability in care, minimize delays in critical interventions, and improve overall patient outcomes.^{2,3} Despite widespread implementation, variability persists in the adherence and efficacy of these protocols across different healthcare settings, particularly in low-resource environments.

The development of evidence-based pediatric emergency care protocols draws from a combination of expert consensus, retrospective data analysis, and randomized controlled trials. Protocols such as Pediatric Advanced Life Support (PALS), Emergency Severity Index (ESI) triage for pediatrics, and Pediatric Assessment Triangle (PAT) are designed to provide clinicians with rapid decision-making tools that prioritize airway, breathing, and circulation stabilization.⁴⁻⁶ Several studies have demonstrated that structured PECPs can reduce mortality, lower the risk of medical errors, and improve the timeliness of interventions.⁷⁻⁹ However, questions remain about the degree to which these protocols are consistently applied, their adaptability across diverse clinical environments, and the outcomes they produce across various pediatric populations.

A systematic review of the efficacy of pediatric emergency care protocols is crucial to identify the strengths and limitations of current practices and to highlight gaps in the literature that need further investigation. Understanding the real-world impact of these protocols, including their influence on mortality rates, hospitalization duration, and caregiver satisfaction, can guide policy changes and protocol refinement. Furthermore, evaluating protocol adherence to healthcare provider training, resource availability, and system-level support is essential for tailoring effective emergency response strategies for children. As pediatric

emergency care continues to evolve, it becomes imperative to critically assess and continuously refine existing protocols to ensure the highest standard of care for all pediatric patients in emergencies.

METHODS

Protocol

This review was carefully structured in alignment with the PRISMA 2020 framework to ensure methodological precision and uphold research integrity. Adhering to these standardized guidelines enhanced the study's transparency, reproducibility, and overall scientific robustness. Each phase of the process—from comprehensive literature retrieval to meticulous data extraction and synthesis—was executed with a focus on minimizing bias and maximizing reliability. This disciplined methodology enhances the trustworthiness of the findings and adds valuable insight to the existing body of evidence-based literature.

Criteria for Eligibility

This systematic review aims to critically evaluate the effectiveness of pediatric emergency care protocols by synthesizing evidence from a wide range of relevant studies. By analyzing recurring themes, identifying key trends, and highlighting gaps in existing research, the review seeks to provide meaningful insights that can guide the optimization of clinical practices. The primary objective is to expand the current understanding of these protocols and contribute to a robust evidence base that supports improved patient care and more informed clinical decisions.

To maintain methodological rigor, the review applied strict inclusion and exclusion criteria. Only peer-reviewed articles published in English from 2015 to 2025 were included, with the authenticity of each source confirmed through DOI verification. Non-primary literature such as editorials, reviews, and duplicate entries were deliberately omitted to ensure the analysis remained focused on original, high-quality studies. This selective approach enhances the credibility and trustworthiness of the review's findings.

By implementing a systematic and comprehensive research methodology, the review ensures that its conclusions are grounded in solid empirical data. The insights generated aim to refine current pediatric emergency care protocols, enhance clinical outcomes, and ultimately improve the quality of care delivered to pediatric patients. Through its evidence-based approach, the study aspires to support the evolution of best practices in emergency pediatric medicine.

Search Strategy

A comprehensive and systematic search strategy was employed to locate relevant studies for this review, utilizing specific keywords such as "pediatric," "emergency care protocol," and "efficacy." To ensure a wide-ranging and balanced collection of scholarly work, the search was conducted across three major academic databases: PubMed, SAGE Publications, and ScienceDirect. This method provided access to a diverse pool of peer-reviewed research, thereby enriching the overall quality and scope of the evidence base. The structured and academically sound search process strengthens the reliability of the findings and contributes to a more nuanced and accurate evaluation of the effectiveness of pediatric emergency care protocols.

Table 1. Search Strategy

<i>Database</i>	<i>Search Strategy</i>	<i>Hits</i>
Pubmed	<i>("pediatric" AND "emergency protocol" AND "efficacy")</i>	3
Science Direct	<i>("pediatric" AND "emergency protocol" AND "efficacy")</i>	112
Sagepub	<i>("pediatric" AND "emergency protocol" AND "efficacy")</i>	9

Data retrieval

The authors employed a meticulous initial screening process by carefully evaluating the titles and abstracts of each retrieved study to assess their relevance to the research objectives. Only studies that met the predefined inclusion criteria

and demonstrated clear alignment with the review's focus were selected for full-text analysis. This structured and deliberate approach facilitated the identification of consistent themes and significant patterns within the literature, ensuring that the synthesis remained tightly aligned with the central research question. By applying a transparent and methodical selection strategy, the review was able to extract and integrate high-quality evidence to support its findings.

To ensure consistency and enhance comparability among the selected studies, only full-text articles published in English were included. A stringent screening protocol was used to verify that each article fulfilled the eligibility requirements and directly addressed the key aims of the study. Articles that did not meet these standards were excluded, resulting in a refined and relevant set of sources. This rigorous selection process played a vital role in reducing bias and improving the validity of the review's conclusions by relying solely on credible, peer-reviewed research.

Additionally, the evaluation process involved a detailed examination of specific study characteristics such as authorship, publication date, geographical setting, and research methodology. This level of scrutiny ensured that only methodologically robust and contextually appropriate studies were included in the final analysis. The adoption of this thorough and well-organized selection framework significantly reinforced the reliability of the review, providing a strong basis for generating meaningful conclusions that enhance clinical understanding of pediatric emergency care protocols.

Quality Assessment and Data Synthesis

The authors employed a rigorous and structured screening process, starting with the careful assessment of study titles and abstracts to identify research that met predefined criteria for relevance and methodological quality. Only studies that closely matched the review's objectives and demonstrated strong scientific rigor were selected for full-text analysis. This targeted selection strategy ensured that only high-quality and meaningful contributions were included, enhancing the overall depth and impact of the review. By focusing exclusively on credible and

contextually appropriate sources, the authors strengthened the precision, coherence, and analytical robustness of their work, ultimately reinforcing the review's validity and scholarly integrity.

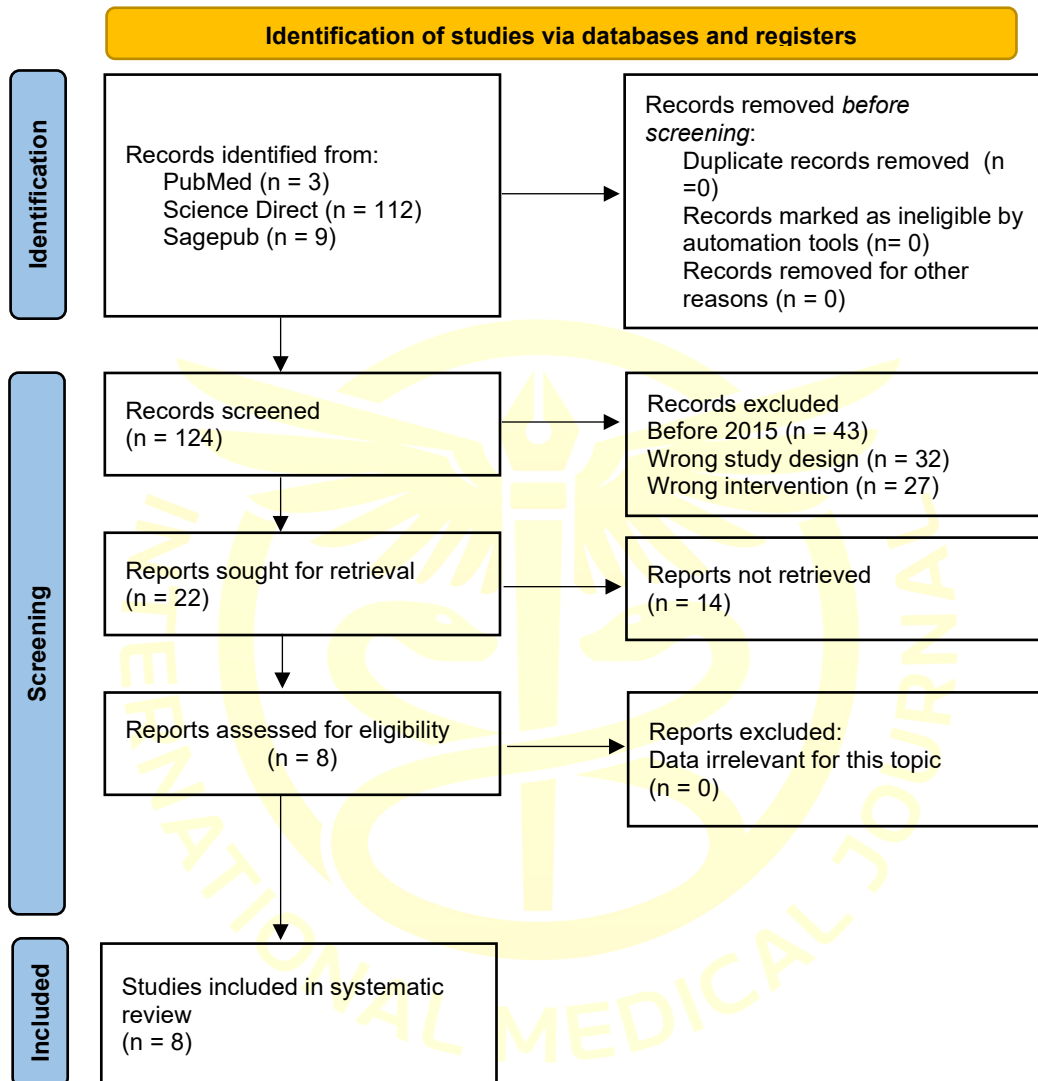


Figure 1. Article search flow chart

Table 2. Critical appraisal of Study

Parameters	(Cohen et al., 2015)	(Crouse et al., 2015)	(Ebbesen et al., 2018)	(Navarro et al., 2018)	(Kim et al., 2023)	(Newgard et al., 2023)	(Teslim et al., 2025)	(Vadakevedan et al., 2025)
1. Bias related to temporal precedence								
Is it clear in the study what is the “cause” and what is the “effect” (ie, there is no confusion about which variable comes first)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Bias related to selection and allocation								
Was there a control group?	No	No	No	No	No	No	No	No
3. Bias related to confounding factors								
Were participants included in any comparisons similar?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
4. Bias related to administration of intervention/exposure								
Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Yes.	Yes.	Yes.	Yes.	No.	Yes.	No.	Yes.
5. Bias related to assessment, detection, and measurement of the outcome								
Were there multiple measurements of the outcome, both pre and post the intervention/exposure?	No	No	No	No	No	No	No	No
Were the outcomes of participants included in any comparisons measured in the same way?	No	No	Yes	No	No	No	No	No
Were outcomes measured in a reliable way?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
6. Bias related to participant retention								
Was follow-up complete and, if not, were differences between groups in terms of their follow-up adequately described and analyzed?	Yes	No	No	Yes	Yes	Yes	No	Yes
7. Statistical conclusion validity								
Was appropriate statistical analysis used?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes

RESULT

The study began with a systematic search of well-established academic databases, including ScienceDirect, PubMed, and SAGE Publications, to identify literature relevant to the review's objectives. A comprehensive three-stage screening process was applied to filter the initial results, ultimately yielding eight studies that met the predefined inclusion criteria. These selected studies underwent detailed analysis, allowing for the extraction and evaluation of core themes and critical findings. To ensure clarity and ease of interpretation, the synthesized results are concisely organized and displayed in Table 3, offering a structured overview that supports effective comparison across the reviewed literature.

Table 3. The literature included in this study

Author	Origin	Method	Sample	Result
Cohen et al.¹⁰ (2015)	USA	Cohort Study	153 sample	The protocol for administering antibiotics to neutropenic patients significantly reduced the time to treatment (TTA) from 96.9 ± 57.8 minutes to 64.3 ± 28.4 minutes, despite challenges such as venous access, physician waiting on results, and antibiotic availability, thereby reducing TTA.
Crouse et al.¹¹ (2015)	USA	Cross Sectional	1.027 participants	The study analyzed 1027 pediatric patients and 196 critically ill children. After implementation, 97.5% of medical records were assigned triage categories. The CI group was more frequently diagnosed with shock, seizures, and malnutrition. Admission rates for the RS and CI sample declined, and LOS and mortality rates showed trends toward decreasing post-implementation. The

				study suggests that pediatric-specific triage algorithms can improve patient care in Latin America.
Ebben et al.¹² (2018)	Netherlands	Systematic Review	10 studies	The review of eleven studies found that educational strategies, either as a standalone intervention or combined with audit and feedback, are effective in improving guideline adherence in ED settings. Reminders also showed positive effects. However, the review does not provide a definitive solution for promoting guideline and protocol adherence in prehospital emergency care.
Navarro et al.¹³ (2018)	Spain	Prospective Study	658 participants	A study recorded 658 sedation-analgesia procedures in pediatric emergency departments, with good effectiveness in 483 cases, partial in 138, and poor in 14. Adverse drug reactions were found in 8.4% of cases, with older children and deeper sedation being independent risk factors.
Kim et al.¹⁴ (2023)	Korea	Observational Studies	289 participants	The study analyzed the safety and efficacy of sequential pediatric sedation protocols for pediatric patients undergoing diagnostic tests in a tertiary medical center. The protocol, consisting of minimum dosages, achieved sufficient depth of sedation with few adverse events, indicating its effectiveness for painless sedation.

<p>Newgard et al.¹⁵ (2023)</p>	<p>USA</p>	<p>Cohort Study</p>	<p>796.937 participants</p>	<p>A study of 796.937 children found that initial care in a quartile 4 emergency department (ED) was associated with 60% lower in-hospital mortality among injured children and 76% lower mortality among medical children. If all EDs were in the highest quartile of pediatric readiness, an estimated 288 injury deaths and 1154 medical deaths could have been prevented.</p>
<p>Teslim et al.¹⁶ (2022)</p>	<p>USA</p>	<p>Review</p>	<p>-</p>	<p>This paper examines pediatric emergency care protocols globally, focusing on common emergencies like trauma, respiratory distress, infections, and dehydration. It compares practices in high-income countries like the US and UK, and low- and middle-income countries like Nigeria and India. Key challenges include lack of trained personnel, limited resources, and medication availability.</p>
<p>Vadakkevadan et al.¹⁷ (2025)</p>	<p>India</p>	<p>Prospective Study</p>	<p>350 participants</p>	<p>A study involving 350 participants found that the PSTS (Patient Safety Techniques) system was effective in predicting hospital admission. The system had a sensitivity of 59.59% and a specificity of 72.61%, while the NICE (Naturalistic Infection Control System) had a sensitivity of 80.31% and a</p>

				specificity of 72.61%. The study found that the PSTS demonstrated fair agreement with the NICE system, but its simplicity makes it potentially useful in resource-limited settings.
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DISCUSSION

The Pediatric Emergency Care Protocol (PECP) serves as a structured and dynamic framework designed to guide healthcare professionals in the rapid identification, prioritization, and management of acute pediatric conditions.¹⁸ It is particularly vital in emergency and high-pressure clinical settings where prompt decision-making can significantly influence morbidity and mortality outcomes in children. The protocol is typically organized into three core phases: triage, systematic assessment, and evidence-based treatment.^{2,19}

Triage in pediatric emergency care is often based on validated tools such as the Pediatric Assessment Triangle (PAT) or the Emergency Severity Index (ESI), which help clinicians determine the severity of a child's condition without requiring extensive diagnostics.^{4,5} PAT evaluates three essential parameters—appearance, work of breathing, and circulation to the skin—to quickly stratify patients into categories such as life-threatening, urgent, or non-urgent. This immediate categorization is particularly crucial in resource-limited environments or overcrowded emergency departments.⁵ The second phase, assessment, follows a structured approach using the ABCDE method (Airway, Breathing, Circulation, Disability, Exposure), ensuring that no critical aspect of the child's condition is overlooked. This systematic method enhances clinical accuracy and prepares the team for timely intervention. Lastly, the treatment phase is protocol-driven and disease-specific, incorporating updated clinical guidelines, medication dosing, and procedural recommendations.¹⁹ Treatment strategies are often tailored to the child's

age, weight, and underlying health status, underscoring the importance of pediatric-specific expertise.²⁰

The scope of conditions addressed within the PECP is both broad and clinically significant. Common emergency presentations covered by the protocol include respiratory emergencies (e.g., asthma, bronchiolitis, croup, pneumonia), neurological crises (such as febrile seizures, meningitis, and altered consciousness), gastrointestinal disturbances (especially dehydration from acute gastroenteritis), infectious emergencies (e.g., sepsis, dengue, malaria), trauma, burns, and anaphylaxis.^{21,22} The inclusion of these conditions reflects not only their frequency in pediatric emergency departments but also their potential for rapid deterioration if not promptly managed. Importantly, a review revealed that protocols emphasizing early recognition of these critical illnesses—especially when combined with structured triage tools—can lead to improved survival rates, reduced hospital admissions, and shorter lengths of stay.²³ This highlights the indispensable role of PECPs in improving pediatric emergency outcomes globally.

In terms of structure, the pediatric emergency care protocol typically follows a standardized flowchart model, which outlines each step from initial contact through stabilization and referral. These models are informed by international best practices, including those from the World Health Organization (WHO), American Academy of Pediatrics (AAP), and Advanced Pediatric Life Support (APLS) frameworks.¹⁹ For instance, the WHO Emergency Triage Assessment and Treatment (ETAT) protocol is widely used in low- and middle-income countries and has proven highly effective in standardizing pediatric emergency responses in resource-limited settings.²⁴ It emphasizes early triage, rapid treatment of emergencies (e.g., shock, respiratory distress, unconsciousness), and identification of children requiring urgent referral.^{24,25} Such structured flows not only ensure timely interventions but also support continuity of care, especially during interdepartmental handoffs or transfers to higher levels of care.

Despite the well-documented advantages of PECPs, several implementation challenges persist. One notable issue is the variability in adherence to standardized protocols across different healthcare settings. Factors contributing to this

inconsistency include inadequate provider training, lack of familiarity with pediatric-specific protocols, high patient volumes, and limited access to essential equipment or medications.²⁶ Additionally, some healthcare facilities operate without integrated digital support systems, which limits real-time decision-making and contributes to delays in care. The systematic review also found that simulation-based training and regular refresher courses significantly improve clinician confidence, protocol adherence, and patient outcomes.²⁷ Furthermore, the use of electronic triage systems, mobile decision-support tools, and pediatric emergency checklists has shown promise in enhancing protocol compliance and reducing errors in high-stress environments.

From a broader perspective, strengthening pediatric emergency care systems requires not only robust protocols but also a supportive institutional infrastructure. This includes the availability of pediatric-trained personnel, continuous professional development programs, multidisciplinary teamwork, and institutional commitment to quality improvement. Integrating feedback loops, performance audits, and outcome monitoring into emergency care services can further optimize the delivery and evolution of PECPs.^{16,28} Additionally, tailoring these protocols to fit the specific epidemiological and resource contexts of different regions is essential for maximizing their impact.

CONCLUSION

In conclusion, the Pediatric Emergency Care Protocol is a cornerstone of effective and timely pediatric emergency medicine. Its structured approach—encompassing triage, systematic assessment, and targeted treatment—ensures rapid identification and management of life-threatening conditions in children. The protocol's disease coverage is comprehensive, addressing the most critical and prevalent pediatric emergencies, and its structured flow aligns with international standards to promote consistency and quality of care. While the protocol's implementation demonstrates significant benefits, addressing barriers such as training gaps, system-level deficiencies, and limited access to technology remains essential. The findings of this systematic review underscore the value of PECPs in

advancing pediatric emergency care and provide a compelling rationale for their continued development, refinement, and global adoption.

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