Nurse-initiated protocols in the emergency department management of pediatric oncology patients with fever and suspected neutropenia: a scoping review protocol

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ABSTRACT

Objective: The objective of this review is to provide an overview of the existing evidence regarding nurse-initiated protocols in the emergency department management of pediatric oncology patients with fever and suspected neutropenia.

Introduction: Febrile neutropenia in pediatric oncology patients poses a significant burden of increased morbidity and mortality. Prompt, efficient emergency care and rapid antibiotic administration within 60 minutes of presentation to hospital is required to prevent clinical deterioration and reduce rates of intensive care admission and mortality. Efficient emergency department care delivery is impacted by modern day challenges, such as increasing user-demand, limited resources, and lack of flow. In response to this, to expedite care provision, practice guidelines have been developed to include nurse-initiated protocols that guide nurses to initiate specific predetermined investigations and interventions for patients meeting certain criteria. Febrile neutropenic pediatric patients may be a specific group that can benefit from nurse-initiated protocols due to the time-critical nature of required care.

Inclusion criteria: The scoping review will consider literature that reports on nurse-initiated protocols in the management of pediatric febrile oncology patients with suspected neutropenia in the emergency department setting.

Methods: JBI methodology for scoping reviews will guide the review process. English-language literature from 2000 to present will be searched in Embase, MEDLINE, Scopus, Ecmare, CINAHL Plus, and gray literature in Google Scholar, Open Grey, and Theses Global. Critical appraisal will not be performed. A tabular and accompanying narrative summary of the information will present extracted evidence aligned to the review’s objective and questions.

Keywords: emergency; febrile; neutropenia; nurse-initiated; pediatric


Introduction

Febrile neutropenia (FN) is the presence of a temperature of >38.3°C or two consecutive readings of >38.0°C over two hours in the setting of an absolute neutrophil count of <0.5 × 10⁹/L.1 It is the leading cause of emergency department (ED) presentation and unplanned hospital admission for children receiving chemotherapy for an oncological condition.2 Up to 80% of children with leukemia and 50% of children with solid tumors will develop FN during the course of oncological treatment.3 In up to one-third of children with FN, bacterial bloodstream infection develops.4 Studies of pediatric mortality resulting from FN conducted in the United States report mortality rates from 3% to 17% if sepsis develops.5,6

Neutrophils are the main cells involved in the immune response to fight infection.3 Due to chemotherapy treatment, neutrophil production is suppressed, making patients more vulnerable to infection. Suspected FN is regarded as a medical emergency, requiring prompt and efficient care.1,4 Prompt time to antibiotic administration in febrile
neutropenic patients has been identified by international panels of experts as a key benchmark of quality care in emergency situations. Prioritizing the patient at triage, rapid assessment, and prompt administration of antibiotics within 60 minutes have been shown to improve survival rates and decrease adverse events. Delays in care and, specifically, delayed antibiotic administration are associated with clinical deterioration, development of sepsis, increased rates of intensive care unit (ICU) admission, increased length of hospital stay, and mortality rates. In a retrospective study by Salstrom et al., 29.9% of children with time to antibiotic delivery >60 minutes were admitted to the ICU compared with 12.6% who received antibiotics in <60 minutes, demonstrating the significant importance of prompt administration of antibiotics.

Although antibiotic administration within 60 minutes from initial presentation to hospital is recommended, delays exist specific to ED management. These delays include prolonged waits for medical assessment, prolonged assessment times, difficulty in obtaining central access and blood samples, lack of standardized antibiotic selection, delays in ordering antibiotics, waiting on neutrophil counts prior to antibiotic order, and waiting on a consultation with oncology teams prior to orders. Wider institutional delays also have a significant impact on care delivery. The demands on EDs are increasing leading to lack of flow and ED overcrowding. The Australian Institute of Health and Welfare reports there were more than eight million presentations to Australian public hospital EDs from 2017 to 2018; a 3.4% rise in just 12 months. The overall increase in presentations, in conjunction with increased patient acuity, workforce shortages, lack of beds for admitted patients, and increased documentation requirements, contribute to ED overcrowding and lack of patient flow.

Lack of flow, also known as “access block,” risks patient safety and has been demonstrated to increase morbidity and mortality rates. A retrospective cohort analysis by Richardson et al. found cohorts of patients who presented during periods of ED overcrowding had mortality rates 34% greater than those admitted during non-overcrowding periods. These results are supported by a retrospective study by Sprivilis et al. who reported ED overcrowding was associated with a 30% increase in mortality.

In order to identify the scope, as well as examine and report upon the existing evidence regarding nurse-initiated protocols in the ED management of pediatric FN, specifically in relation to patient outcomes, clinical care delivery, and ED flow, a scoping review has been identified as the most appropriate and feasible approach to evidence synthesis.

The preliminary search conducted across MEDLINE (Ovid; Appendix I), Embase, and CINAHL revealed the existence of a small number of primary research articles specific to nurse-initiated protocols in ED management of pediatric FN. These were quality improvement projects conducted within EDs as single center studies. Vedi et al. demonstrated a reduction in time to antibiotics from 148 minutes to 65 minutes with the introduction of a FN protocol, which prompted nurses to initiate care (including venous access and blood tests) prior to medical review. Another quality improvement project by Lukes et al. successfully reduced time from triage to antibiotic administration from 128 minutes to 53 minutes with the implementation of nurse-initiated venous access, blood collection, and antibiotic administration. No existing systematic reviews were identified that examine the effect of nurse-initiated protocols in the ED management of pediatric FN. In further, broader searches, five systematic reviews were identified that examined the...
impact of nurse-initiated analgesia and x-rays in the ED and the associated impact on wait times and length of stay.\textsuperscript{20-24} Although evidence related to length of stay was conflicting, shorter time to treatment, reduction in ED crowding, and improved patient satisfaction were reported. In light of the existing primary research evidence in FN and the benefit of nurse-initiation of medications and investigations among other patient groups, further specific investigation into the evidence around nurse-initiated protocols in ED management of FN is warranted.

The aim of this review is to develop a consolidated evidence base to support future research, and policy and practice recommendations regarding ED care of pediatric oncology patients with suspected FN via nurse-initiated protocols.

**Review questions**

What is the evidence regarding nurse-initiated protocols in the ED management of pediatric oncology patients with fever and suspected neutropenia?

The following subquestions will be examined:

i) What are the sources of delays to treatment in the ED management of pediatric FN?

ii) What are the key features of nurse-initiated protocols in the ED management of pediatric FN?

iii) What outcomes have been reported when nurse-initiated protocols have instigated ED care of the pediatric FN patient?

iv) What are the barriers and facilitators to nurse-initiated protocols in the ED management of pediatric FN?

**Inclusion criteria**

**Participants**

The review will consider all studies of pediatric oncology patients with fever and suspected neutropenia accessing emergency treatment in a pediatric ED setting. This is a specific patient group that is particularly susceptible to rapid progression of infection and sepsis,\textsuperscript{3,4} therefore studies that include febrile, pediatric patients without oncological background will be excluded, as will studies in adult populations.

**Concept**

The review will consider all studies that include nurse-initiated, protocol-based care pathways that guide nurses to initiate investigations and interventions. It will include any nurse-initiated care provision, nurse-initiated venous access, nurse-initiated pathology, nurse-initiated medication, and studies that describe the components, implementation, results, and impact of nurse-initiated FN care in the ED. Research that describes multidisciplinary, quality-improvement projects will be included provided that nurse-led or initiated processes/protocols formed part of the overall quality improvement project. Any report that describes only medical-led interventions as part of quality improvement projects will be excluded.

**Context**

This scoping review will seek to identify relevant literature regarding emergency management, therefore, only evidence from acute care ED settings will be eligible for inclusion. All international evidence meeting the inclusion criteria will be included for review in order to provide a broad overview of all available research.

**Types of sources**

Due to the emergent nature of literature regarding nurse-initiated protocols in the ED management of pediatric FN patients and apparent shortage of studies on the effectiveness of these interventions, this scoping review will consider a wide variety of sources. Full text literature published from the year 2000 to present will be included to allow as much evidence as possible to be captured. This is also the timeframe during which nurse-initiated protocols have largely been implemented.\textsuperscript{19} All existing primary and evidence synthesis research literature, including reviews, meta-analyses, primary research, and gray literature, will be included for review. The source of information is not limited to studies of specific designs or types to allow for the identification and mapping of all the relevant existing research.

**Methods**

This scoping review methodology will utilize the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews\textsuperscript{25} (PRISMA-ScR) reporting guideline and checklist. This scoping review will follow the JBI approach for the conduct and reporting of scoping reviews.\textsuperscript{26,27}
Search strategy
As recommended by JBI,27 a three-step search strategy will be utilized. The first step will include an initial basic search using a combination of keywords and medical subject headings in MEDLINE (PubMed) and Emcare (Ovid; Appendix I). An analysis of the title and abstract of each article will be undertaken to identify common keywords and index terms used. Following this analysis, a second search using all identified keywords, index terms, synonyms, and concepts related to the review aims, objectives, and questions will be conducted across the following databases: Embase, MEDLINE, Scopus, Emcare, and CINAHL Plus. Gray literature will be searched in Google Scholar, Open Grey, and Theses Global. In addition to this, specific emergency medicine and nursing journals will be individually searched, including the Journal of Emergency Nursing, Annals of Emergency Medicine, European Journal of Emergency Medicine, Emergency Medicine Journal, Emergency Medicine, and Academic Emergency Medicine. As the review question is broad, to achieve greater sensitivity in the search, the same search strategy, where possible, will be conducted across search engines. If additional keywords and potentially useful search terms are discovered during the initial searches, they will be incorporated. Finally, to ensure all possible studies have been identified, the reference list of the studies included for review will be searched for any further relevant studies.

Study selection
Decisions regarding literature selection will be based on the predetermined inclusion criteria, as described above. The results from the database and gray literature search will be transferred to the web-based software platform, Covidence (Veritas Health Innovation, Melbourne, Australia) to assist with literature management, including importing citations, screening for duplication, and sharing between researchers. Titles and abstracts will be screened for relevance, then followed by full text screening. Sources of evidence that appear to be relevant will be examined in more detail against the inclusion criteria in full-text form. The primary reviewer (KN) will lead the process of study screening and selection supported by other reviewers (KG, MP). Consensus on which studies are to be included will be discussed amongst reviewers until agreement is reached. Reasons for the exclusion of studies at the full-text selection stage will be recorded and reported in the scoping review. The selection process will be mapped, demonstrating the inclusion and exclusion process, in a PRISMA flow chart. Assessment of methodological quality will not be performed.

Data extraction
The focus of data extraction will be on the nurse-initiated protocols to identify the key components, benefits, and challenges or issues. Evidence regarding clinical care and patient outcomes when nurse-initiated protocols have directed care will be sought. The extraction process will be conducted by the primary reviewer, with consultation and guidance from a secondary reviewer. If disagreements occur between reviewers, the third reviewer will be consulted.

To achieve a logical and descriptive summary of the results that aligns with the review’s aim, objective, and questions, a draft charting table has been developed and adapted (Appendix II).27 The aim of this table is for the systematic data extraction to record key information, including the source/database, author, publication year, aims, methods, study size, duration, and results or findings relevant to the review questions. This table may be further refined throughout the scoping review and any updates explained.

Data presentation
The results of the scoping review will be presented in a descriptive narrative synthesis that relates to the aims and objectives of the review. Results will be classified under main conceptual categories and arranged into themes. A discussion will be provided regarding the results of the scoping review and if the evidence supports or refutes the continued development of this practice. Final conclusions will be drawn from the mapped evidence.

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References
17. Richardson D. Increase in patient mortality at 10 days associated with emergency department overcrowding. MJA 2006;184:213–6.

Appendix I: Search strategy

MEDLINE (Ovid)

#Searches   Results
1. exp infant/ 1,122,708
2. exp child/ 1,879,308
3. exp adolescent/ 1,992,407
4. exp pediatrics/ 57,026
5. (infant" or infant^ or baby or babies or neonat" or newborn or new-born or toddler" or child" or adolescent" or teen" or youth" or juvenile" or boy" or girl" or p?ediatric").mp. 4,306,214
6. or/1-5 4,306,732
7. exp neutropenia/ 18,437
8. exp neoplasm/ 3,287,913
9. (neutrop" or granulo" or leuko" or cancer" or tumor" or tumour" or neoplas" or malignan" or carcinoma" or lymphoma" or leukemia" or leukaemia or myeloma" or oncolog").mp. 4,779,396
10. or/7-9 4,957,304
11. exp fever/ 42,608
12. exp bacterial infection/ 876,588
13. exp sepsis/ 120,795
14. (fever" or febrile or infect" or sepsis or septic or pyrex" or hypertherm").mp. 2,464,284
15. or/11-14 2,776,405
16. hospital emergency service/ 66,257
17. exp emergency health service/ 136,448
18. emergency nursing/ 7013
19. exp emergency treatment/ 117,208
20. emergency/ 39,863
21. (emergenc^ adj5 (department^ or ward^ or service^ or unit^ or room^ or hospital^ or care or patient^ or nurse or nurses or nursing or physician^ or doctor^ or medicine or treatment^ or diagnos^ or resident^ or accident)).mp. 242,184
22. (ER or ED).mp. 165,950
23. or/16-22 505,508
24. exp nursing/ 250,764
25. exp nurse/ 86,987
26. exp nursing staff/ 65,507
27. nurs^ .mp. 723,430
28. or/24-27 731,766
29. 6 and 10 and 15 and 23 and 28 40
30. limit 29 to yr = “2000 -Current” 30
31. limit 30 to english language 28
# Appendix II: Data extraction instrument

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<td>Outcome on time to antibiotic administration</td>
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<td>Identified facilitators of nurse-initiated protocols in ED FN care</td>
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<td>Experiences of patients and/or nurses when a nurse-initiated protocols has instigated FN care in the ED</td>
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Adapted from JBI study details, characteristics and results extraction instrument.