Effectiveness of nurse-initiated interventions on patient outcomes in the emergency department: a systematic review protocol

Luke Burgess • Kate Kynoch

Nursing Research Centre, Queensland Centre for Evidence Based Nursing and Midwifery: a Joanna Briggs Institute Centre of Excellence.
Mater Misericordiae Ltd

Review question/objective: The objective is to evaluate the effectiveness of nurse-initiated interventions (NIIs) on patient outcomes in the emergency department (ED). More specifically, the objectives are to identify the effectiveness of NIIs, including but not limited to, nurse-initiated medications, nurse-initiated intravenous fluid therapy and nurse-initiated pathology on patient waiting time, time to treatment, length of stay, pain levels, symptom relief, patient satisfaction, leave without being seen rates and mortality rates in ED settings.

Keywords Emergency department; nurse-initiated analgesia; nurse-initiated intravenous fluid; nurse-initiated medication; nurse-initiated thrombolysis


Background

Throughout health systems globally, there is an increasing demand for emergency department (ED) services. This increased demand alongside a constrained supply of ED resources results in access blocks, increased patient waiting times and increased ED length of stay (LOS). These issues can lead to negative outcomes such as longer waits for treatment, suboptimal or delayed delivery of analgesia and symptomatic relief resulting in higher pain and discomfort, higher levels of morbidity and mortality, and decreased levels of patient satisfaction.

The increasing demand for ED services has led to the development of a variety of approaches to be employed to ensure that demand is met. National Emergency Access Targets, in which 85% of patients should be seen, treated and discharged within 4 h; urgency-related triage scales; short stay units; and streaming of lower urgency presentations to ambulatory fast-track treatment areas are some examples.

Extending the scope and role of nurses in the ED is another strategy to address these issues. An example of extended nursing practice in ED is the use of nurse-initiated interventions (NIIs). Standard practice within EDs consists of medical officers examining patients and ordering treatment and investigations that nurses may then carry out. The registered nurses’ scope of practice does not include prescribing of medications or fluids, nor does it include the ordering of investigations such as x-rays and blood tests. Nurse-initiated interventions allow nurses to initiate treatment and investigations before the medical officer’s intervention. This is generally via a standing order or a protocol-based care pathway. Examples of NIIs include pathology ordering, radiology ordering such as limb x-ray, medications such as analgesia, anti-emetics, thrombolysis, fluid initiation and nurse-initiated admission or discharge. Many of these utilize a protocol-based or standing order process, in which patients meeting pre-defined criteria are identified by nurses and have their care or treatment commenced with the goal of ensuring that the patient’s care is promptly provided and distressing symptoms are relieved in a timely manner. Emergency department nurses have a specialized set of skills and knowledge that enable them to rapidly and safely care for and treat acutely unwell, undiagnosed patients. Evidence suggests that nurses with the correct training and support are willing to
and have the ability to operate in advanced scopes of practice, as they gain fulfilment from contributing to treatment decisions and want to positively influence the outcomes of their patients. These interventions have been shown to have an impact on a number of outcomes, from reducing waiting time to be seen, reducing time to analgesia or treatment, improved patient satisfaction and decreased ED LOS.

Pain is one of the most common presenting complaints in the ED and patients may wait for lengthened periods of time for pain relief interventions to be initiated, particularly during periods of high acuity. Pain assessment is a core component of nursing care in the ED, and nurses have the ability to lessen or minimize the potential suffering of patients. Studies have shown that nurse-initiated analgesia can lead to improved pain relief, shorter time to analgesia and increased patient satisfaction. Patients presenting with minor limb injuries requiring x-ray are often allocated to lower urgency categories and have long waits to see a doctor. Nurse-initiated radiology (NIR), generally x-ray ordering for limb injuries, has been proven to be safe and effective. This may decrease LOS and reduce time to treatment by removing unnecessary time spent waiting before a decision to x-ray is made. Certain conditions are time-sensitive, and treatment delays can lead to irreversible disease or death. Therefore, early identification and treatment of these conditions are critical. An example is acute myocardial infarction (AMI), for which early thrombolysis can be a lifesaving treatment. A post study of nurse-initiated thrombolysis looked at the effect of this intervention alongside a chest pain triage protocol and found that it could reduce the time to thrombolysis for those suffering AMI from a median time of 50–58 min pre to 25–30 min post, which was found to be statistically significant (P < 0.001).

However there has been no systematic review conducted looking directly at the effect of NIIIs on outcomes such as waiting times (which is the time from triage to initiation of treatment), time to treatment (which begins to be measured once triage is completed), LOS, pain or symptom relief, patient satisfaction and mortality. Five previous systematic reviews have reported on outcomes related to NIIIs as part of larger reviews looking at specific outcomes such as patient flow, overcrowding, ED waiting times and interventions to improve pain management. Of the systematic reviews reported, three have examined nurse-initiated x-ray (NIXR). Rowe et al. looked specifically at the effect of triage nurse ordering (TNO) on overcrowding within the ED. The authors of this review did not clearly define ordering, but the search strategy focused on radiography, x-rays and test ordering. Their findings suggested that TNO may be effective in reducing ED overcrowding by reducing ED LOS, especially for x-ray ordering at triage for suspected fracture. Outcomes such as time to treatment, patient satisfaction and pain management were not explored. They did not report on the effect of ordering by other nurses in ED other than those at triage. Oredsson et al. in a systematic review examining triage-related interventions to improve patient flow, reported on the effectiveness of NIXR on waiting time and LOS and found no clear benefit of either. As part of a systematic review on reducing attendances and waits in EDs, Cooke investigated NIXR and its impact on waiting times within ED, concluding that it may be of benefit when there is no streaming service such as a fast-track treatment stream operating. A 2015 review examined the effect of a clinical initiatives nurse on ED throughput. The review found that initiatives such as NIXR and nurse-initiated analgesia had no impact on patient flow.

The use of NIIIs to manage pain was explored in a 2014 systematic review that investigated interventions to improve pain management in ED. This review reported that changes to nursing roles could have a positive impact on pain management but did not define what these changes were and did not provide any specific outcomes such as time to analgesia or subjective pain level measurements. There has been no systematic review examining the specific effect of NIIIs on outcomes such as time to treatment (other than nurse-requested x-ray), time to analgesia, relief of pain, relief of symptoms and patient satisfaction. Therefore this systematic review aims to identify the effect of NIIIs in the ED on patient LOS, waiting time, time to treatment, pain levels, symptom relief, patient satisfaction, leave without being seen rate and mortality rates.

**Inclusion criteria**

**Types of participants**
The current review will consider studies that include all patients accessing treatment in an ED setting, including adult and pediatric patients.
Types of intervention
The current review will consider all studies that include NIs in the ED, including, but not limited to, studies that evaluate nurse-initiated pathology, nurse-initiated medications and nurse-initiated intravenous fluid therapy. Nurse-initiated x-ray will be excluded as this has been reported on in the literature.

Outcomes
The current review will consider studies that include the following outcome measures:
Primary outcomes: time to treatment in minutes or hours, pain levels/management preferably measured by validated scores, symptomatic relief/management preferably measured by clinical assessment of symptom control or resolution or admitted as in-patient.
Secondary outcomes: patient waiting time in minutes or hours, LOS in the ED in minutes or hours, patient satisfaction as self-reported by patient, leave without being seen rates measured by those who were triaged but did not wait to be seen by a doctor and mortality rates.

Types of studies
The current review will consider both experimental and epidemiological study designs including randomized controlled trials, non-randomized controlled trials, quasi-experimental, before and after studies, prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies for inclusion.

The current review will also consider descriptive epidemiological study designs including case series, individual case reports and descriptive cross-sectional studies for inclusion.

Search strategy
The search strategy aims to find both published and unpublished studies. A three-step search strategy will be utilized in this review. An initial limited search of MEDLINE and CINAHL will be undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe the article. A second search using all identified keywords and index terms will then be undertaken across all included databases. Third, the reference list of all identified reports and articles will be searched for additional studies. Studies published in English will be considered for inclusion in this review. Studies published since 2000 will be considered for inclusion in this review. The start date has been chosen because this correlates with the period in which the major ED triage tools had been developed and were in use around the world, and is therefore relevant to current ED nursing practice.

The databases to be searched will include: PubMed, CINAHL, Embase, PsycINFO, Web of Science, Cochrane Central Register of Controlled Trials.
The search for unpublished studies will include: ProQuest Dissertations and Theses and Mednar.

Initial keywords to be used will be: “nurse initiated medication,” “nurse initiated analgesia,” “nurse initiated thrombolysis,” “nurse initiated intravenous fluid,” “nurse initiated pain relief,” emergency, “emergency department,” “accident and emergency,” casualty, “nurse initiated pathology,” “nurse initiated phlebotomy” and “nurse initiated blood test.”

Assessment of methodological quality
Papers selected for retrieval will be assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardized critical appraisal instruments from the Joanna Briggs Institute Meta Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (Appendix I). Any disagreements that arise between the reviewers will be resolved through discussion or with a third reviewer.

Data extraction
Data will be extracted independently by two reviewers from papers included in the review using the standardized data extraction tool from JBI-MAStARI (Appendix II). These data extracted will include specific details about the interventions, populations, study methods and outcomes of significance to the review question and specific objectives.

Data synthesis
Quantitative data will, where possible, be pooled in statistical meta-analysis using Review Manager (RevMan) Version 5.3.5 (Copenhagen: The Nordic Cochrane Centre, Cochrane Collaboration, 2014). Effect sizes expressed as odds ratio (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed.
statistically using the standard chi-square and also explored using subgroup analyses based on the different study designs included in this review. Where statistical pooling is not possible, the findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.

References


Appendix I: Appraisal instruments

**MAStARI appraisal instrument is a test message**

### JBI Critical Appraisal Checklist for Randomised Control / Pseudo-randomised Trial

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Unclear</th>
<th>Not Applicable</th>
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<tr>
<td>1. Was the assignment to treatment groups truly random?</td>
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<td>2. Were participants blinded to treatment allocation?</td>
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<td>3. Was allocation to treatment groups concealed from the allocator?</td>
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<td>4. Were the outcomes of people who withdrew described and included in the analysis?</td>
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<td>5. Were those assessing outcomes blind to the treatment allocation?</td>
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<td>6. Were the control and treatment groups comparable at entry?</td>
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<td>7. Were groups treated identically other than for the named interventions</td>
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<td>8. Were outcomes measured in the same way for all groups?</td>
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<td>9. Were outcomes measured in a reliable way?</td>
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<td>10. Was appropriate statistical analysis used?</td>
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**Overall appraisal:** Include □ Exclude □ Seek further info. □

Comments (Including reason for exclusion)

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**JBI Critical Appraisal Checklist for Descriptive / Case Series**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Unclear</th>
<th>Not Applicable</th>
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<tr>
<td>1. Was study based on a random or pseudo-random sample?</td>
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<td>2. Were the criteria for inclusion in the sample clearly defined?</td>
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<td>3. Were confounding factors identified and strategies to deal with them stated?</td>
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<td>4. Were outcomes assessed using objective criteria?</td>
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<td>5. If comparisons are being made, was there sufficient descriptions of the groups?</td>
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<td>6. Was follow up carried out over a sufficient time period?</td>
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<td>7. Were the outcomes of people who withdrew described and included in the analysis?</td>
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<td>8. Were outcomes measured in a reliable way?</td>
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<td>9. Was appropriate statistical analysis used?</td>
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Overall appraisal: Include [ ] Exclude [ ] Seek further info [ ]

Comments (including reason for exclusion)

________________________________________________________________________
JBI Critical Appraisal Checklist for Comparable Cohort/Case Control

Reviewer ___________________________ Date ___________________________

Author ___________________________ Year ___________ Record Number ___________

1. Is sample representative of patients in the population as a whole?  
Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

2. Are the patients at a similar point in the course of their condition/illness?  
Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

3. Has bias been minimised in relation to selection of cases and of controls?  
Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

4. Are confounding factors identified and strategies to deal with them stated?  
Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

5. Are outcomes assessed using objective criteria?  
Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

6. Was follow up carried out over a sufficient time period?  
Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

7. Were the outcomes of people who withdrew described and included in the analysis?  
Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

8. Were outcomes measured in a reliable way?  
Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

9. Was appropriate statistical analysis used?  
Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

Overall appraisal: Include ☐  Exclude ☐  Seek further info. ☐

Comments (Including reason for exclusion)

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Appendix II: Data extraction instruments

MAStARI data extraction instrument

### JBI Data Extraction Form for Experimental / Observational Studies

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<td>Author</td>
<td>Year</td>
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<tr>
<td>Journal</td>
<td>Record Number</td>
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#### Study Method

- RCT
- Quasi-RCT
- Longitudinal
- Retrospective
- Observational
- Other

#### Participants

- Setting
- Population

#### Sample size

- Group A
- Group B

#### Interventions

- Intervention A
- Intervention B

#### Authors Conclusions:

- 
- 
- 

#### Reviewers Conclusions:

- 
- 
- 

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### Study results

#### Dichotomous data

<table>
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<th>Outcome</th>
<th>Intervention ( ) number / total number</th>
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#### Continuous data

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<th>Outcome</th>
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