

# Emergency department model of care: nurse-initiated interventions

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Rapid evidence checks are based on a simplified review method and may not be entirely exhaustive, but aim to provide a balanced assessment of what is already known about a specific problem or issue. This brief has not been peer-reviewed and should not be a substitute for individual clinical judgement, nor is it an endorsed position of NSW Health.

## Evidence check

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### Evidence check question

What is the evidence on the effectiveness of nurse-initiated emergency care protocols on patient outcomes and emergency department performance?

### Summary

The findings of this review provided strong evidence that nurse-initiated protocols are effective in reducing time-to-analgesia, time-to-treatment, time-to-radiography, overall length of stay as well as improved pain relief and decreased admission rates. High levels of satisfaction related to protocol use were reported by consumers, physicians and emergency nurses.

### In brief

- A recent systematic review explored the effectiveness of nurse-initiated interventions on patient outcomes in the emergency department (ED).<sup>1</sup> Although, these interventions and protocols were heterogeneous across the 26 eligible studies, results favoured nurse-initiated protocols in that they were effective in reducing time-to-analgesia,<sup>2-5</sup> time-to-treatment<sup>6,7</sup> as well as improved pain relief<sup>3,8,9</sup> and decreased admission rates.<sup>10-13</sup> Investigations to capture nurse adherence to protocols post implementation was not fully evaluated.
- A randomised controlled evaluation of six nurse-initiated protocols for five common ED problems: fever or pain, suspected hip fracture, chest pain, vaginal bleeding in pregnancy and abdominal pain found that nurse-initiated protocols reduce time to analgesia, time-to-radiography, and overall length of stay. High levels of satisfaction related to protocol use were reported by both physicians and emergency nurses.<sup>14</sup>
- A systematic review of nurse-initiated X-ray for ED patients with distal limb injuries found that the intervention is safe and acceptable to patients. However, nurse-initiated radiology did not reduce time to X-ray or waiting time. But there was a trend towards decreasing ED length of

stay and reducing the need for unplanned follow-up when compared with physician-initiated X-ray ordering.<sup>15</sup>

- A systematic review evaluated the impact and quality of pain management associated with nurse-initiated analgesia in patients presenting to the ED. It included 12 studies and revealed that nurse-initiated analgesia was associated with safe, timely and effective pain relief. Nurses were able to independently manage mild- to severe-pain. When compared to routine ED analgesic delivery with patients receiving nurse-initiated analgesia, patients were nearly five times more likely to receive an analgesic sooner and administration typically occurred within 30-60 minutes.<sup>5, 9, 16</sup>
- Implementing the nurse-initiated ED sepsis protocol in two EDs in the USA improved serum lactate measurement and median time to initial antibiotic administration.<sup>17</sup>
- Several studies that investigated paediatric nurse-initiated ED protocols came to the following conclusions.
  - The use of nurse-initiated protocols to manage appendicitis has provided a stronger scientific foundation for clinical practice to achieve consistency, efficiency, effectiveness, quality, and safety in medical care.<sup>18</sup>
  - The use of nurse-initiated corticosteroid therapy for asthma exacerbations was associated with decreased time to corticosteroid administration, admission rates, and post-corticosteroid emesis.<sup>10</sup>
  - The use of nurse-initiated pain protocol with medication algorithms for use in triage improved the treatment of pain and resulted in significant increase in patients with severe pain receiving analgesic medications which was correlated with increased parents' satisfaction.<sup>19</sup>
  - The ED nurse-initiated neonatal jaundice management protocol was associated with reduced time to bloodwork, phototherapy, ED length of stay for discharged patients and improved nursing documentation.<sup>7</sup>

## Background

There is an increasing demand on ED services worldwide that leads to extended overall length of stay in the ED and contributes to overcrowding and adverse outcomes.<sup>20</sup> In addition, constrained ED resources can lead to longer wait time for assessment and treatment, access block and overall decreased levels of staff and patient satisfaction.<sup>21</sup> A number of initiatives and ED models of care have been introduced to address these challenges, one of which is the nurse-initiated emergency care protocols model of care.

Nurse-initiated interventions allow nurses to initiate care before a medical officer's intervention, generally via a standing order or a protocol-based care pathway.<sup>1</sup> Patients meeting pre-defined criteria are identified and have their care or treatment commenced earlier, with the goal of ensuring the patients' care is promptly provided and distressing symptoms are relieved in a more timely manner than would have occurred under standard care models.

The purpose of this evidence review is to evaluate current evidence to determine if nurse-initiated protocols can be safely implemented to improve ED wait times, time to disposition, patient/family satisfaction, and patient outcomes in the emergency setting.

## Methods

Peer-reviewed articles were identified through PubMed, Google, and Google Scholar. The search terms used are outlined in Appendix 1.

## Limitations

Nurse-initiated emergency care protocols and interventions evaluated in this evidence check were heterogeneous. Outcome measurements in some studies were based on small sample size or from single centre study design.

## Results

**Table 1**

Note some of the information has been copied directly from the source material.

Source	Summary
<b>Peer reviewed sources</b>	
<p><a href="#">Quality and impact of nurse-initiated analgesia in the emergency department: A systematic review</a></p> <p>Varndell, <i>et al.</i> 2018<sup>16</sup></p>	<p>A systematic review of published research on the quality and impact of nurse-initiated analgesia in adult patients presenting to EDs in acute pain applied the Cochrane Collaboration method.</p> <ul style="list-style-type: none"> <li>The review included 12 studies published between 1999 and 2018, involving 6641 adult patients, and were from a wide range of countries: Australia (n=5), USA (n=3), Sweden (n=1), Iran, (n=1) the Netherlands (n=1) and Hong Kong (n=1).</li> <li>Primary outcomes consisted of time to analgesia, change in pain score; adverse events; patient satisfaction and documenting pain assessment.</li> <li>The review revealed that nurse-initiated analgesia was associated with safe, timely and effective pain relief.</li> <li>Overall, nurses were able to independently manage mild to severe pain and when comparing routine ED analgesic delivery with patients receiving nurse-initiated analgesia, patients were nearly five times more likely to receive an analgesic sooner with administration typically occurring within 30–60 minutes.</li> </ul>
<p><a href="#">A Pragmatic Randomized Evaluation of a Nurse-Initiated Protocol to Improve Timeliness of Care in an Urban ED</a></p> <p>Doiuma, <i>et al.</i> 2016<sup>14</sup></p>	<p>Randomised, pragmatic, controlled evaluation of six nurse-initiated protocols for five common ED problems: fever or pain, suspected hip fracture, chest pain, vaginal bleeding in pregnancy and abdominal pain in a medium-sized, inner-city western Canadian ED with 55 beds. The outcome measures included time to diagnostic test, time to treatment, time to consultation, or ED length of stay in addition to physician and ED nurse satisfaction.</p> <ul style="list-style-type: none"> <li>Nurse administration of acetaminophen reduced the median time to analgesia or antipyretic by 186 minutes.</li> <li>The suspected fractured hip protocol reduced the median time to radiography by 257 minutes and length of stay by 224 minutes.</li> <li>The suspected ischemic chest pain protocol resulted in a significant reduction in time to laboratory-reported troponin level, however, did not reduce the length of stay of enrolled patients.</li> <li>The vaginal bleeding during pregnancy protocol, consisting of serum haemoglobin level, rhesus typing, and b-human chorionic gonadotropin testing alone, reduced median ED length of stay from 527 minutes in the control group to 295 minutes in the intervention group.</li> </ul>

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Source	Summary
<b>Peer reviewed sources</b>	
	<ul style="list-style-type: none"> <li>The median ED length of stay for patients enrolled in the lower abdominal pain protocol intervention group and upper abdominal pain intervention group was reduced by 181 and 131 minutes respectively.</li> </ul> <p>Overall, both physicians and emergency nurses experienced high levels of satisfaction related to protocol use.</p>
<p><a href="#">Advanced Nursing Directives: Integrating Validated Clinical Scoring Systems into Nursing Care in the Paediatric ED</a></p> <p>Deforest et al. 2012<sup>18</sup></p>	<ul style="list-style-type: none"> <li>A review of literature on nurse-initiated protocols conducted in 2012. The authors used the appendicitis clinical pathway for children presenting to a paediatric ED with suspected appendicitis to demonstrate the successful integration of validated clinical scoring systems into practice using advanced nursing directives.</li> <li>The review concluded that the use of nurse-driven protocols is known to provide a stronger scientific foundation for clinical practice, to achieve consistency, efficiency, effectiveness, quality, and safety in medical care.</li> <li>Integrating previously validated, evidence-based clinical prediction rules into nursing care in the paediatric ED allows nurses to use their advanced assessment skills and apply previously validated research.</li> </ul>
<p><a href="#">The effectiveness of nurse-initiated interventions in the Emergency Department: A systematic review</a></p> <p>Burgess et al. 2020<sup>1</sup></p>	<ul style="list-style-type: none"> <li>A systematic review of literature investigating effectiveness of nurse-initiated interventions on patient outcomes in the ED.</li> <li>Interventions considered for inclusion were those that evaluated nurse-initiated interventions in the ED, such as nurse-initiated pathology, nurse-initiated medications, and nurse-initiated intravenous fluid therapy.</li> <li>Nurse initiated x-ray was excluded.</li> <li>Overall, 26 studies were included. Of those studies, nine were randomised control trials, and 17 used a quasi-experimental design. Twelve studies involved paediatric patients only, and 14 included adult patients only.</li> <li>Nurse-initiated interventions were effective in reducing time-to-analgesia, time-to-treatment for acute respiratory distress as well as improved pain relief and decreased admission rates.             <ul style="list-style-type: none"> <li>Four studies reported on time-to-treatment for acute respiratory distress due to asthma or chronic obstructive pulmonary disease exacerbations.</li> <li>Nurse-initiated nasogastric tube (NGT) reinsertion for patients presenting to ED after their NGT had dislodged significantly improved time-to-treatment by a median of 78.5 min.</li> </ul> </li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
	<ul style="list-style-type: none"> <li>○ Nurse-initiated neonatal jaundice management reduced time-to-bilirubin sampling by 22% (36 minutes versus 28 minutes (<math>p &lt; 0.001</math>)), and time-to-phototherapy initiation (42 minutes vs 34 minutes (<math>p = 0.032</math>)).</li> <li>○ Four studies reported on admission rates as a result of nurse-initiated treatment: acute respiratory distress (<math>n=3</math>) and neonatal jaundice (<math>n=1</math>). All studies reported decreased rates of admission in the nurse-initiated group.</li> <li>○ One study reported on nurse-initiated ultrasound guided intravenous catheter insertion. The intervention did not improve time-to-treatment when compared to standard care.</li> <li>○ Nurse-interventions were inhaled beta-agonist and oral corticosteroids. Time-to-inhaled beta-agonist was investigated by two studies: both studies reported statistically significant reduced time-to-treatment. Three of the four studies investigated nurse-initiated corticosteroids for acute asthma exacerbations in children. Statistically significant improvements in mean time-to-steroid were reported by all three studies.</li> <li>○ Eight out of nine studies reported statistically significant reductions in time-to-analgesia and 10 out of 13 studies reported statistically significant reduced patient-reported pain levels in the nurse-initiated analgesia group respectively.</li> </ul>
<p><a href="#">Impact of nurse-initiated ED sepsis protocol on compliance with sepsis bundles, time to initial antibiotic administration, and in-hospital mortality</a></p> <p>Bruce, et al. 2015<sup>17</sup></p>	<ul style="list-style-type: none"> <li>● A retrospective review for adult patients admitted through two tertiary hospital EDs in the USA with discharge diagnosis of severe sepsis or septic shock.</li> <li>● The project is aimed to evaluate the impact of a nurse-initiated ED sepsis protocol on time to initial antibiotic administration and ascertain compliance with three-hour surviving sepsis campaign targets.</li> <li>● Implementing the nurse-initiated ED sepsis protocol improved serum lactate measurement (83.9% vs 98.7%, <math>P = 0.003</math>) and median time to initial antibiotic administration (135 minutes vs 108 minutes, <math>P = .021</math>) significantly compared to the pre-implementation control group.</li> </ul>
<p><a href="#">Improving timeliness for acute asthma care for paediatric ED patients using a nurse driven intervention: an</a></p>	<ul style="list-style-type: none"> <li>● The introduction of a nurse initiated, standardised protocol for corticosteroid therapy for asthma exacerbations in a paediatric ED was associated with decreased time to corticosteroid administration, admission rates, and post-corticosteroid emesis.</li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
<p><a href="#">interrupted time series analysis</a></p> <p>Brown, et al. 2016<sup>10</sup></p>	
<p><a href="#">Effectiveness of nurse-initiated X-ray for emergency department patients with distal limb injuries: a systematic review</a></p> <p>Considine, et al. 2019<sup>15</sup></p>	<ul style="list-style-type: none"> <li>• A systematic review to determine the effectiveness of nurse-initiated X-ray for ED patients with distal limb injuries included 16 studies between 1971 and 2018 and involved 8,881 participants.</li> <li>• The primary outcomes were X-ray request practices and accuracy of X-ray requests. Secondary outcomes were time to X-ray, waiting time (defined as the time from triage to medical assessment), ED length of stay and patient satisfaction.</li> <li>• Due to heterogeneity of patients, providers and outcomes, a meta-analysis was not performed.</li> <li>• There were four randomised trials and 12 observational studies that focused on X-ray request accuracy (n = 14), emergency department processes (n = 6) and patient outcomes (n = 2).</li> <li>• Nurse-initiated X-ray was found to be safe and acceptable to patients.</li> <li>• Nurse-initiated X-ray did not reduce time to X-ray or waiting time but in some studies, reduced emergency department length of stay and unplanned follow-up.</li> </ul>
<p><a href="#">Effectiveness of emergency nurses' use of the Ottawa Ankle Rules to initiate radiographic tests on improving healthcare outcomes for patients with ankle injuries: A systematic review</a></p> <p>Ho, et al. 2016<sup>22</sup></p>	<ul style="list-style-type: none"> <li>• This systematic review was designed to capture the most accurate information available on the extent to which emergency nurses' use of the Ottawa Ankle Rules to initiate radiographic tests improves healthcare outcomes for patients with ankle injuries.</li> <li>• The Ottawa Ankle Rules provide guidelines for clinicians on the recommendation of radiographic tests to verify fractures in patients with ankle injuries.</li> <li>• The search yielded 1,603 records; 17 articles met the eligibility criteria.</li> <li>• The results indicated that emergency nurses' use of the refined Ottawa Ankle Rules minimised unnecessary radiographic-test requests and reduced patients' length of stay in ED.</li> <li>• The implementation of the refined Ottawa Ankle Rules by emergency nurses with different backgrounds, including nurse practitioners or general emergency nurses was found to reduce patients' length of stay in emergency departments.</li> </ul>

Source	Summary
<b>Peer reviewed sources</b>	
<p><a href="#">Outcomes of a nurse-initiated intravenous analgesic protocol for abdominal pain in an emergency department: A quasi-experimental study</a></p> <p>Muntlin, et al. 2011<sup>23</sup></p>	<ul style="list-style-type: none"> <li>• A quasi-experimental design conducted in an ED at a Swedish university hospital to investigate the outcome of nursing assessment, pain assessment and nurse-initiated intravenous opioid analgesic compared to standard procedure for patients seeking emergency care for abdominal pain.</li> <li>• The nursing assessment and the nurse-initiated intravenous opioid analgesic resulted in significant improvement in frequency of receiving analgesic and a reduction in time to analgesic. Patients perceived lower pain intensity and improved quality of care in pain management.</li> </ul>
<p><a href="#">A Prospective Study Evaluating Impact of a Nurse-initiated Protocol on Pain Management and Parental Satisfaction</a></p> <p>Guiner, et al. 2020<sup>19</sup></p>	<ul style="list-style-type: none"> <li>• A single centre study introduced nurse-initiated pain protocol (PP) with medication algorithms for use in triage (n=1590).</li> <li>• The introduction of a PP in the ED setting improved the treatment of pain in this paediatric cohort. There was a significant increase in patients with severe pain receiving analgesic medications which was correlated with increased parents' satisfaction especially when children received pain medication in a timelier fashion.</li> </ul>
<p><a href="#">A nurse-initiated jaundice management protocol improves quality of care in the paediatric emergency department</a></p> <p>Long et al. 2017<sup>11</sup></p>	<ul style="list-style-type: none"> <li>• A pre-post intervention study performed at the Children's Hospital of Eastern Ontario ED.</li> <li>• The study was designed to test the impact of a nurse-initiated management protocol for jaundiced neonates in the ED. The nurse-initiated protocol involved authorising serum bilirubin sampling and phototherapy initiation before physician assessment.</li> <li>• Randomly selected charts were evaluated for 266 neonates who were included in the study (131 neonates in the control group and 135 in the intervention group).</li> <li>• The intervention group had improved median time from triage to serum bilirubin sampling (22.2% reduction).</li> <li>• Phototherapy initiation documentation was improved in the intervention group.</li> <li>• The ED nurse-initiated neonatal jaundice management protocol was associated with reduced time to bloodwork, phototherapy, ED LOS for discharged patients and improved nursing documentation.</li> </ul>
<p><a href="#">Nurse initiated reinsertion of nasogastric tubes in the Emergency Department: A</a></p>	<ul style="list-style-type: none"> <li>• A single centre prospective randomised controlled trial in Hong Kong for patients requiring nasogastric tube (NGT) reinsertion.</li> </ul>



Source	Summary
<b>Peer reviewed sources</b>	
<p><a href="#">randomised controlled trial</a></p> <p>Ho, et al. 2013<sup>6</sup></p>	<ul style="list-style-type: none"> <li>• Patients were randomised to receive treatment by either nurse-initiated reinsertion of NGT (NIRNGT) or the standard NGT insertion protocol.</li> <li>• Door-to-treatment time of the NIRNGT group (mean = 45.6 minutes) was significantly shorter than the standard NGT insertion group (mean = 123.08 minutes; p = 0.003).</li> <li>• No statistically significant difference was detected between the total ED length of stay.</li> <li>• Patients, relatives and nurses were generally satisfied with the new treatment protocol.</li> </ul>
<p><a href="#">A systematic review of the impact of nurse-initiated medications in the emergency department</a></p> <p>Cabilan et al. 2017<sup>9</sup></p>	<ul style="list-style-type: none"> <li>• Five experimental studies were included in this review: one randomised controlled trial and four quasi-experimental studies conducted in paediatric and adult EDs.</li> <li>• The nurse-initiated medications were salbutamol for respiratory conditions and analgesia for painful conditions.</li> <li>• Enabled patients to receive the medications quicker by half-an-hour compared to those who did not have nurse-initiated medications.</li> <li>• No effect on adverse events, doctor wait time and length of stay.</li> <li>• Nurse-initiated analgesia was associated with increased likelihood of receiving analgesia, achieving clinically-relevant pain reduction, and better patient satisfaction.</li> </ul>
<p><a href="#">The Use of a Nurse-Initiated Pain Protocol in the Emergency Department for Patients with Musculoskeletal Injury: A Pre-Post Intervention Study</a></p> <p>Sepahvand et al. 2019<sup>5</sup></p>	<ul style="list-style-type: none"> <li>• Pre-post intervention study was conducted on 240 patients with orthopaedic injuries in an ED in Iran.</li> <li>• The intervention consisted of case study sessions and the implementation of the nurse-initiated pain management protocol.</li> <li>• The mean pain intensity 30 and 60 minutes after triage and at discharge decreased significantly in the post-intervention group (p &lt; .001).</li> <li>• Patients' satisfaction with pain management (p &lt; .01) and the nurses' performance (p &lt; .001) improved in the post-intervention group.</li> <li>• Waiting time: there was a significant reduction in the post-intervention group from the end of triage by the nurse to the visit by the physician, and from patient's arrival in ED to discharge or transferring, and also the time to initial analgesic.</li> </ul>

## Appendix

### PubMed search terms

((("emergency medical services"[MeSH Terms] OR "emergency medical services"[All Fields] OR "emergency service"[Title/Abstract] OR "emergency medical services"[Title/Abstract] OR "emergency medicine"[Title/Abstract] OR "emergency department"[Title/Abstract] OR "emergency hospital"[Title/Abstract] OR "emergency hospitals"[Title/Abstract] OR "emergency medical service"[Title/Abstract] OR "emergency medicine"[Title/Abstract] OR "emergency service, hospital"[MeSH Terms] OR ED[Title/Abstract] OR "urgent care"[Title/Abstract] OR ambulatory care[MeSH Terms] OR ambulatory care facilities[MeSH Terms])) AND ((Models, Organizational[MeSH] OR organizational innovation[MeSH] OR "Patient-Centered Care/organization and administration"[Mesh] OR Delivery of Health Care, Integrated[MeSH] OR "model of care"[tiab] OR "models of care"[tiab] OR "care model"[tiab] OR "care delivery model"[tiab] OR "organisation of"[tiab] OR "organisational model"[tiab] OR "organisation model"[tiab] OR "organization of"[tiab] OR "organizational model"[tiab] OR "organization model"[tiab] OR "healthcare delivery model"[tiab] OR "integrated care"[tiab] OR "integrated model"[tiab] OR model[title]))) AND (("triage"[MeSH Terms] OR "triage"[title])) AND ((english[Filter]) AND (2012:2022[pdat]))

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### Inclusion and exclusion criteria

Inclusion	Exclusion
<ul style="list-style-type: none"> <li>Nurse-initiated emergency care protocols in the Emergency Department</li> <li>2001-2022</li> </ul>	<ul style="list-style-type: none"> <li>Nurse-Initiated Care based outside the Emergency Department.</li> <li>Articles published in any language other than English</li> </ul>

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