


BMJ Open Quality Roles and responsibilities of registered nurses in the early recognition and management of sepsis in acute hospital settings: a scoping review

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ABSTRACT

Introduction Sepsis causes over 20% of deaths annually, with early recognition and management being key strategies to preventing patient deterioration. Despite being the largest group of hospital-based clinicians, the role of registered nurses (RNs) in sepsis remains poorly defined.

Objective To describe the roles and responsibilities of RNs in early recognition and management of sepsis in acute hospital settings, applying the *Action, Actor, Context, Target and Time* (AACTT) Implementation Science Framework to specify nursing behaviours across domains, and identify evidence gaps to inform future research and practice.

Methods The review was conducted using the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) checklist. We searched Medline, EMBASE, CINAHL and PubMed for studies discussing the contribution of RNs in acute hospital-based sepsis care. Data were extracted and mapped to the AACTT framework domains.

Results 27 (90%) of 30 included studies described RNs as the *actor* responsible for the *action* of sepsis screening. 26 studies (87%) described RN *actions* relating to timely care escalation and sepsis management. A broader range of *actions* was identified in resource-restricted *contexts*, with three (10%) studies reporting RN-initiated blood tests, chest X-rays, intravenous fluids and antimicrobials. Across 16 studies (53%), eight roles with dedicated focus on sepsis identification and management were identified; only one study outlined formal training requirements. Nurse practitioners were excluded here given their credentialed role and scope.

Conclusion Nurses perform essential actions in early sepsis recognition and management, with several RN roles focused on sepsis care identified. A broader scope of nurse-initiated actions was identified in resource-restricted contexts to meet clinical demand. There is potential for a greater scope of nursing actions in sepsis care for the benefit of patients and health services, but to achieve this, standardised training requirements need to be developed, and scope of practice defined.

INTRODUCTION

Recognising and managing patient deterioration due to sepsis is a major challenge in

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Sepsis is a global health challenge and as the largest group of clinicians who provide the greatest percentage of bedside-level hospital care, registered nurses (RNs) are well-positioned to identify patient deterioration due to sepsis.

WHAT THIS STUDY ADDS

⇒ This review uses a behavioural specification framework to map and describe the roles and responsibilities of RNs across early recognition, escalation and management of sepsis. It identifies a broader scope of nursing actions in resource-restricted contexts, driven by patient acuity and clinical workload. We found a lack of clarity regarding the formal training requirements of nurses in roles with a dedicated focus on sepsis recognition and management in acute hospital settings.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Sepsis is a global healthcare priority. Enabling nurses to practise to their full scope in acute sepsis presentations has considerable potential to enhance patient safety, care quality and efficiency of the healthcare system. Further work is needed to develop targeted implementation strategies that define and detail the appropriate actions, responsibilities and training for nurses in dedicated sepsis roles. These initiatives could be particularly beneficial in resource-restricted contexts with inequitable access to healthcare services.

healthcare. Sepsis accounts for at least 20% of global deaths, with 85% occurring in low- and middle-income countries.¹ In Australia, over 18 000 people are diagnosed with sepsis annually, resulting in more than 5000 deaths and 50% of survivors experiencing disability or impaired function.² Sepsis can be defined as 'life-threatening organ dysfunction caused by dysregulated host response to infection', indicated by a sequential organ failure assessment

score increase of two or more, correlating with over 10% in-hospital mortality.³ The variability in physiological responses to sepsis is complex and its diagnosis remains a clinical decision with ongoing debates regarding definition, screening protocols and management.¹ Early recognition and management remain the mainstay of sepsis care.

Clinical nurses in acute hospital settings spend a significant proportion of their working hours engaged in direct patient monitoring and care provision, so are well-positioned to recognise and help prevent patient deterioration.⁴ Recent evidence demonstrates that nurse-initiated sepsis care reduces time to antibiotic administration, admissions to the intensive care unit (ICU), sepsis-related mortality and healthcare costs.^{5–8}

For the purposes of this review, early sepsis care was divided into three phases, (1) recognition, (2) escalation and (3) management. *Recognition* referred to the act of identifying potential sepsis through vital sign monitoring and screening, and *escalation* was the act of alerting the clinical team to the patient's deterioration status and activating a sepsis alert if available. *Management* encompassed the primary actions of the Surviving Sepsis Campaign (SSC) Bundle of Care guideline⁹ including blood culture and venous blood lactate sampling, the administration of intravenous fluid (IVF) boluses and antimicrobials, end-organ support and monitoring.

In 2022, the Australian Government released the first-ever national Sepsis Clinical Care Standard¹⁰ to promote the standardisation of best-practice sepsis care and recommended that sepsis care programmes be implemented in all acute hospital settings. This recommendation informed our decision to employ an implementation science framework in this review.

Nurses make up 50% of the health workforce⁴ and have untapped potential to drive and lead sepsis identification with timely initiation of evidence-informed management. To date, there has been little empirical exploration of the

professional training and capabilities of registered nurses (RNs) who provide sepsis care in acute hospital settings, what actions they perform, in what context and how this care delivery varies across patient cohorts.

To address this research gap, we employed an implementation science framework to map the roles and responsibilities of nurses in recognition and management of sepsis in acute hospital settings. Implementation science is a discipline that employs a scientific approach to developing methods that translate research discoveries and evidence-informed techniques into clinical practice.¹¹ These methods support the identification of barriers and enablers to practice change and the sustainable adoption of evidence into usual care. Critical to the success of any implementation initiative is the ability to clarify who (*actor*), needs to be doing what (*action*), where (*context*, setting or environment), for whom (*target*) and when (*time*). The *Action, Actor, Context, Target, Time* (AACTT) framework, as shown in figure 1¹² was developed to facilitate a systematic approach to specifying behaviours necessary for effective and sustained uptake of new or revised interventions.¹²

No internationally recognised sepsis guidelines^{3 9 13} explicitly describe the role or responsibilities of nurses in recognition and management of sepsis, and thus nurses' work and contribution are largely undefined as a component of usual care provision. Lack of clarity regarding *actors* (which nurses) and *actions* (scope /or types of responsibilities) compromises ability to describe and measure nurses' scope and impact on patient outcomes and system efficiency.

OBJECTIVE

This review aims to identify the roles and responsibilities of RNs in early recognition and management of sepsis in acute hospital settings; map them to the domains of the AACTT Implementation Framework to specify nursing

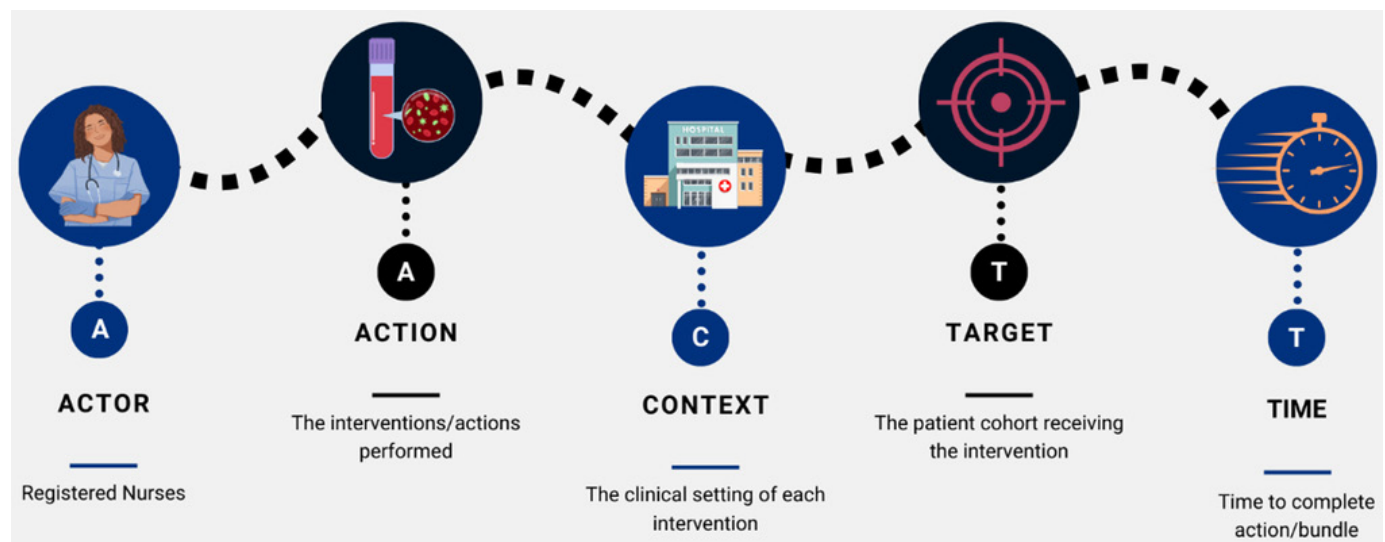


Figure 1 Domains of the AACTT framework.

behaviours across domains, and to identify evidence gaps to inform future research and practice.

METHODS

The review was conducted in accordance with the five stages recommended by the Arksey and O'Malley Framework¹⁴ using the Joanna Briggs Institute Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist.¹⁵ Two reviewers independently performed a title and abstract screen followed by a full screen of all the remaining articles using a standardised data extraction template. The review was registered under the Open Science Framework website. All review papers are available in the public domain, so no ethics approval was necessary. No previously published scoping review protocol on this topic was found during the preparation and planning of this review.

A scoping review serves to describe, map and summarise the available literature relating to the roles and responsibilities of nurses in sepsis care. A wide range of academic and grey literature can be screened for inclusion and heterogeneity of study design is acceptable.¹⁴ For our study, a scoping review enabled inclusion of a broad scope of studies reducing the likelihood of excluding critical research not meeting the stringent inclusion criteria of a systematic review. Our multidisciplinary team of clinician researchers (AL, ZR, MK, AW, RB, AR, CI, KT and LG) worked together in a manner consistent with the scoping review approach which rests on the epistemological foundations of constructivism and interpretivism, drawing on the expertise, real life experiences and perspectives of the research team combined with a reflective and reflexive approach to data analysis and to the research question.¹⁶

Search strategy and eligibility criteria

A systematic search was conducted for empirical studies that mention nurses in the recognition and management of adult patients at risk of sepsis with one or more of the specified outcomes: inpatient mortality, length of hospital stay and cost to the healthcare service. Experimental and quasi-experimental pre-implementation and post implementation studies, prospective, retrospective and quality improvement studies were all eligible. Paediatric study populations were excluded. The search was limited to sepsis recognition (Time Zero) up to the first 6 hours of management. The context was restricted to acute care hospital inpatient settings. Studies exclusively set in ICUs were excluded as were prehospital and ambulance settings, residential aged care and primary care contexts.

A preliminary search was conducted in Embase, MEDLINE and CINAHL, as well as a grey literature search through the web browser Google Scholar and Duck Duck Go to explore current literature for relevant publications. A systematic search strategy was conducted in Embase, Medline, CINAHL and PubMed on 17 May 2023 and repeated in February 2025 to check for any new literature published since May 2023

with five additional studies selected postscreening, making a total of 30 included studies as shown in [table 1](#).

The central search words were *nurse*, *guideline* or *clinical pathway*, *sepsis*, *screening*, *bundle* or *toolkit* (see online supplemental appendix 1). 'Guideline' was selected to capture both the international and local guidelines for sepsis and 'clinical pathway' encompassed sepsis pathways and protocols used in the acute hospital setting. 'Bundle' and 'toolkit' are interchangeable terms used that include both a bundle of care for sepsis management and a set of actions performed to diagnose sepsis. The search was limited to 2013 onwards, considering the multiple guideline changes and updates generated by the SSC.¹⁷ The search was restricted to studies published in English and the reference lists of included articles were screened for relevant studies along with a grey literature search of general and specific websites of interest.

Study selection, data extraction and synthesis

Articles that provisionally met inclusion criteria were uploaded into Covidence,¹⁸ which is a web-based collaboration software platform that streamlines the production of systematic and other literature reviews. A team of reviewers (AL, ZR, MK, AW, RB, AR, CI, KT and LG) performed title and abstract screening followed by a full text review of selected articles against the inclusion criteria (AL, ZR, CI and KT). Reasons for exclusion at full text screening were recorded and reported with conflicts or disagreements discussed and resolved among the reviewers. The results of the search and the study inclusion process are reported in full and presented in a PRISMA flow diagram as shown in [figure 2](#).

A primary data extraction tool was developed by the review team (AL, ZR, KT, MK and LG) and piloted in Covidence before finalisation. Data extraction was performed by AL with a second reviewer performing independent data extraction on at least 10% of the studies (ZR and CI) to ensure consistency of method. Data extraction included study methods, participants, details of the intervention and study-specific key findings. The actions of nurses in sepsis care were extracted and mapped to the AACTT framework domains across the phases of recognition, escalation and management (see online supplemental table 1 designed by AL, LG and ZR).

RESULTS

The systematic searches of databases identified 893 studies and following duplicate removal, 707 underwent title and abstract screening. 246 articles underwent full text review, with 30 meeting the inclusion criteria (see [table 1](#)).

Study design

The 30 papers selected included 25 quasi-experimental studies, 4 observational studies and 1 process improvement study (see [table 1](#)). Of the quasi-experimental group, 21 (70%) were pre-implementation and post implementation studies,^{8 19–38} with three of these being Plan-Do-Study-Act quality improvement initiatives^{24 29 35} and one process improvement study.³⁹ Four observational implementation

Table 1 Key characteristics of papers

Author	Country of publication	Study design	Population sample size	Aim
Benson <i>et al</i> ¹⁹	USA	Quasi-experimental Pre-implementation and post implementation	Inpatients with SIRs database query Pre (n=123), post (n=116)	Improve SIRS detection and NP-RRT sepsis guideline compliance via database query.
Biederman <i>et al</i> ³⁵	USA	Quasi-experimental Implementation QI study with PDSA cycle	ED patient screened for sepsis. Pre (n=1961/17406), post (n=9132/9645)	Standardise sepsis recognition and response to improve outcomes and bundle adherence.
Boussina <i>et al</i> ³⁶	USA	Prospective before-and-after quasi-experimental study	ED patients in Sepsis-3 criteria Pre (n=5065), post (n=1152)	Evaluate COMPOSER's impact on sepsis detection care compliance and patient outcomes.
Braddock <i>et al</i> , 2014	USA	Quasi-experimental Prospective interventional study	Inpatients discharged. Pre (n=9000), post (n=13 743)	Assess a microsystem-level safety programme on rates of hospital-acquired sepsis.
Bruce <i>et al</i> ²⁰	USA	Quasi-experimental Retrospective chart review of pre-implementation and post implementation data	ED patients discharged with a diagnosis of severe sepsis or septic shock. Pre (n=62), post (n=75).	Assess nurse-initiated ED sepsis protocol effects on antibiotic timing, SSC compliance and mortality predictors.
Brusco <i>et al</i> ⁷	Australia	Quasi-experimental Non-randomised stepped wedge cluster implementation study design	Inpatient and ED patients. Pre (n=876), post (n=1476).	Assess nurse-led Sepsis Pathway implementation across 10 Victorian public health services.
Burke <i>et al</i> , 2018	UK	Prospective observational study	Ward patients receiving Sepsis Six Bundle (n=207)	Assess Sepsis Six bundle delivery by CCOT on patient outcomes.
Cranston <i>et al</i> ³⁹	USA	Process improvement project	All sepsis cases submitted for SEP-1 compliance; n not stated.	Improve early sepsis recognition and management with sepsis nurse coordinator.
Cull <i>et al</i> ³⁷	USA	Quasi-experimental before-and-after study comparing baseline and intervention period	Inpatient ESM encounters. Pre (n=11 512), post (n=1 171) sepsis diagnosis codes	Evaluate the ESM as a sepsis screening tool and its link to sepsis-related mortality.
Ferguson <i>et al</i> ⁴⁵	USA	Quasi-experimental Retrospective, interrupted time-series QI cohort evaluation	ED patients. Sepsis discharges pre 8.4%, post 9.4% of 106 220 discharges over 7 years.	Promote early sepsis recognition and treatment using nurse-led ED Code Sepsis and Inpatient Power Hour.
Gatewood <i>et al</i> ²¹	USA	Quasi-experimental Before and after retrospective cohort study	ED patients with sepsis. Pre (n not stated). Post (n=624 of 1032 cases)	Develop an implement a protocol for early sepsis identification and treatment in an ED
Gomez <i>et al</i> , 2024	USA	Quasi-experimental Pre-implementation and post implementation QI project	Not stated	Improve time to antibiotics, mortality, observed over-expected mortality and bundle compliance.
Gripp <i>et al</i> ⁴⁶	USA	Quasi-experimental Prospective quality improvement implementation project	Short stay inpatients with positive sepsis screen, pre (n not stated), post (n=32)	Improve timely sepsis care by implementing SSC 1 hour bundle.
Gyang <i>et al</i> ⁴¹	USA	Observational implementation pilot study of prospectively screened patients	Inpatients on acute unit screened for sepsis (n=245)	Assess nurse-driven sepsis screening tool in mixed medical-surgical non-ICU patients.

Continued

Table 1 Continued

Author	Country of publication	Study design	Population sample size	Aim
Huff <i>et al</i> ²²	USA	Quasi-experimental Pre-implementation and post implementation study	245 inpatient charts/ completed vital signs entered (n=2492)	Enhance vital sign monitoring and electronic NEWS-sepsis alert system.
Jones <i>et al</i> ²³	USA	Quasi-experimental QI pre-implementation and post implementation study	Inpatient sepsis screens. Pre 10%, post 33% (n=56 190 screens of 9718 patients)	Develop nursing programme for early sepsis recognition and timely management.
Judd <i>et al</i> ⁴²	USA	Retrospective observational study	ED and inpatients screened for sepsis. Pre (n=181), post (n=216)	Assess clinical and economic impact of nurse-led electronic sepsis screening.
Lopez-Bushneil <i>et al</i> ²⁴	USA	Quasi-experimental Implementation QI study with PDSA cycle	Hospital inpatients with positive sepsis screen (n=225)	To reduce the number of mortalities due to sepsis on the general units.
McLaughlin <i>et al</i> ²⁵	USA	Quasi-experimental, single-centre, retrospective implementation study	ED patients ordered antibiotics. Pre (n=1146), post (n=1110)	Reduce time from antibiotic order to administration to meet Sepsis Core Measure standards.
Moore <i>et al</i> ²⁶	USA	Quasi-experimental Pre-retrospective and post-retrospective chart review	ED patient charts positive sepsis screen/diagnosis. Pre (n=90), post (n=91)	Assess nurse-driven DART protocol on sepsis care, communication checklist and 3-hour bundle compliance.
Moxham and MacMahon-Parkes ²⁷	UK	Quasi-experimental Retrospective pre-implementation and post implementation evaluation	Medically expected patients with ↑NEWS score. Pre (n=84), post (n=106)	Assess intervention effect on waiting times, hospital admissions and timing of treatments/investigations.
Powell <i>et al</i> ²⁸	USA	Quasi-experimental Pre-in situ and post-in situ simulation	Rural ED patients with sepsis/shock. Pre-training (n=629), post-training (n=1124)	Assess impact of care team in situ simulation training on telemedicine use in ED.
Roney <i>et al</i> , 2019	USA	Quasi-experimental PDSA pre-implementation and post implementation	139 acute care nurses (12% male, 88% female) evaluated the tool	Assess MEWS sepsis screening tool implementation and impact.
Stellpflug <i>et al</i> ³⁰	USA	Quasi-experimental Pre-implementation and post implementation	All patients admitted to 27-bed gen-med unit wearing wrist monitor	Enhance early detection of patient deterioration via continuous vital sign monitoring.
Taj <i>et al</i> ³¹	Tanzania	Quasi-experimental Pre-implementation and post implementation	ED patients diagnosed with sepsis or septic shock (n=126)	Implement a modified sepsis protocol in the ED and measure its impact on sepsis outcomes.
Tedesco <i>et al</i> ³²	USA	Quasi-experimental Pre-implementation and post implementation	ED patients screened (n=247), confirmed infections (n=161)	Reduce sepsis-related mortality with a nurse-driven screening and management algorithm.
Threatt ³³	USA	Quasi-experimental Pre-implementation and post implementation	ED patients screened for sepsis (n=165)	To evaluate the impact of an evidence-based ER Nurse Sepsis identification Tool (ERNSIT).
Thursky <i>et al</i> ⁸	Australia	Quasi-experimental, pre-post, mixed-methods exploratory design	323 inpatients in cancer hospital. Pre (n=111), post (n=212)	Implement hospital-wide sepsis pathway and assess impact on outcomes and healthcare use.
Torsvik <i>et al</i> ³⁴	Norway	Quasi-experimental Pre-implementation and post implementation	Ward patients with bloodstream infection. Pre (n=472), post (n=409)	Assess ward-based SIRS/organ failure triage tool with alert and treatment flowchart.

Continued

Table 1 Continued

Author	Country of publication	Study design	Population sample size	Aim
Westphal <i>et al</i> ⁴³	Brazil	Observational cohort study	ED and inpatients diagnosed with sepsis (n=637)	Describe impact of early warning system on time to diagnosis, antibiotic delivery and mortality.

CCOT, critical care outreach team; COMPOSER, COnformal Multidimensional Prediction Of SEpsis Risk; DART, Detect, Act, Reassess, Titrate nursing protocol; ED, emergency department; ESM, Epic Sepsis Model; ICU, intensive care unit; MEWS, Modified Early Warning Score; NEWS, National Early Warning Score; NP-RRT, nurse practitioner-rapid response team; PDSA, Plan-Do-Study-Act; QI, quality improvement; SEP-1, Severe Sepsis and Septic Shock Early Management Bundle; SIRS, Systemic Inflammatory Response Syndrome; SSC, Surviving Sepsis Campaign.

studies (13%) included two prospective,^{40 41} one retrospective⁴² and one cohort study.⁴³ All studies featured a specified intervention. Study outcome measures varied and consisted of 12 studies (40%) measuring sepsis-related mortality,^{7 22–24 29 32–34 43–45} 7 studies (23%) reporting on length of stay in hospital,^{7 8 27 30 32–34} and 4 papers (13%) analysed healthcare-related cost-savings due to the intervention.^{7 8 19 25}

Nursing roles and responsibilities data mapped to the domains of the AACTT Implementation Framework

Actor domain

All the included studies (n=30) featured RNs as the primary actors. There were eight RN roles described with a

dedicated focus on emergency sepsis care (recognition and management) as part of their substantive role, including ED triage nurse,^{20 21 38 45} critical care outreach team (CCOT) nurses who provided a rapid response service,⁴⁰ ICU nurses working as tele-consultants to support rural ED staff,²⁸ sepsis nurse coordinator,^{33 39 45} sepsis nurse,³⁸ sepsis team captain,³⁸ continuous monitoring unit (CMU) nurse³⁹ and practice development nurse.⁷ Four papers described nurse practitioner (NP) roles^{19 23 27 38} (not included in the group of eight discussed above) featuring nurses with a formalised advanced scope of practice with prescribing rights. (Online supplemental table 1)

Action domain

Recognition

All studies except one²⁵ described the RN as responsible for routine sepsis screening—either through monitoring vital signs to identify early warning signs or responding to automated sepsis alerts generated by the electronic medical record (EMR) system. Six studies (20%) focused exclusively on nurse-initiated sepsis screening.^{22 29 30 35 41 43} Electronic screening and automated alerts were discussed in 14 (47%) of the studies where RNs reviewed the patient to validate the alert and followed the designated sepsis protocol.^{19 21–23 30 33 35–39 42 43 46}

Escalation

Nurses were responsible for communicating concern about patients with suspected sepsis in 16 (53%) of the studies.^{7 8 19–21 24 28 30 32–34 40–42 45 46} 10 (33%) studies described specific communication tools or strategies for nurses to use when escalating care to senior clinicians^{8 24 26 28 30 33 34 38–40} such as checklists, ISBAR/SBAR (Identity, Situation, Background, Assessment and Recommendation) and scripted communication aids. Nurses were responsible for responding to or activating a Sepsis Code in 12 studies (40%)^{20–22 26 30 33 36–39 45 46} either via EMR or an overhead speaker system.

Nurses in roles with a dedicated sepsis focus or where there was a dedicated sepsis focus integrated within their role responsibilities provided decision support to ward and ED nurses about patients meeting sepsis criteria.^{7 8 23 24 38–40 42 44} In one study,³⁹ the CMU nurse remotely monitored all ED patients via a Sepsis Best Practice Alert dashboard and escalated care remotely when a

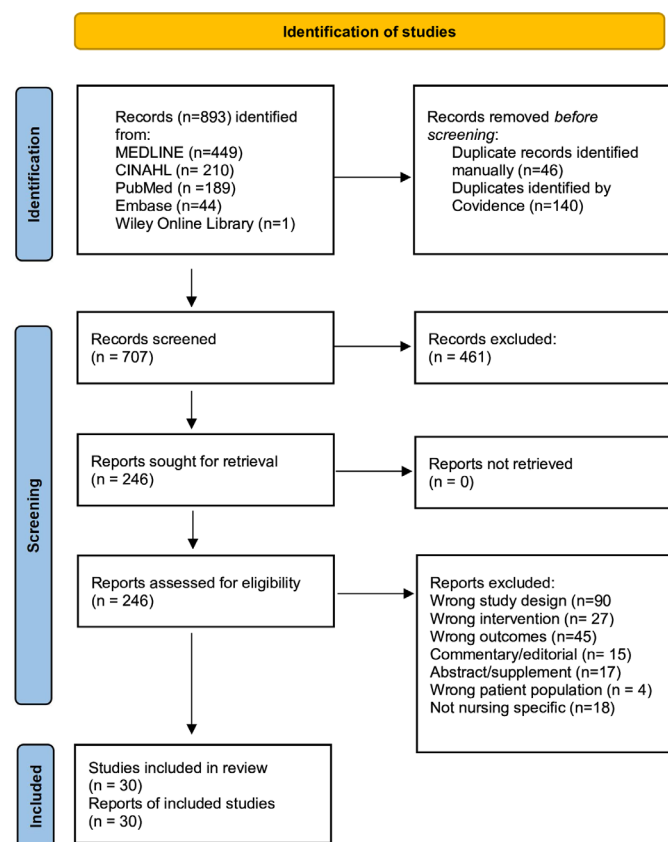


Figure 2 PRISMA flow diagram of study selection. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

patient met sepsis criteria. Another intervention²⁸ in two North American rural EDs described a 24-hour ICU nurse teleconsultation service for ED staff. The ICU nurses would then escalate to an ICU consultant if required.

Management

26 studies (87%) described actions relating to the management of sepsis (see online supplemental table 1). 11 papers (37%) discussed nurse-initiated sepsis bundles (excluding NPs) that enabled RNs to initiate investigations such as a serum lactate level and blood cultures.^{7 8 20 21 24 31 32 36 38 40 45} 10% of studies reported an RN-initiated IVF bolus of 1 L,²¹ 500 mL⁴⁵ or a volume calculated with pharmacy assistance which the RNs then administered.³⁹ Four papers (13%) described the role of NPs who initiated all investigations and therapies as independent practitioners.^{19 23 27 45}

Three studies (10%) set in resource-restricted contexts^{31 38 40} described the action of nurse-initiated SSC bundled care⁹ including blood cultures, serum lactate, restricted-volume IVFs and antimicrobials. A Tanzanian study³¹ and North American study³⁸ based near the Mexican border reported extended nurse-initiated investigations including a complete metabolic panel and full blood count, with Gomez *et al*³⁸ also reporting nurse-initiated chest X-rays.

Context domain

14 of the studies (47%) were based in inpatient settings, including a specialist cancer hospital, 11 (37%) were based in ED and 5 (17%) included both ED and inpatient settings. 10% of the studies were set in low socioeconomic resource-restricted contexts as discussed above.^{31 38 40}

Target domain

All the studies featured adult patients with one study featuring patients with cancer only.⁸

Time domain

Time to sepsis recognition through routinised or nurse-initiated sepsis screening was described in four studies (13%), which defined their Time Zero^{26 31 39 40} as the starting point to initiate time-sensitive SSC Core Bundle guideline interventions.⁹

DISCUSSION

Using the AACTT framework, this review has specified the various roles and responsibilities of nurses in the early recognition and management of sepsis, with the RN as *actor* performing *actions* occurring across all phases of early sepsis care. The *context* domain impacted on the responsibilities of RNs, revealing an extended range of *actions* such as initiating blood tests, chest X-rays, IVFs and first-dose antimicrobials in resource-restricted settings.

Several nursing roles were described with dedicated focus on sepsis care identified in the *actor* domain. An inductive analysis of these roles across the included

studies revealed a lack of information regarding professional criteria and formal training requirements.

ACTIONS OF NURSES DELIVERING SEPSIS CARE

As the clinicians who spend the most amount of time with patients, nurses were unsurprisingly found to be the primary *actors* carrying out the *actions* of sepsis screening and escalating care to other members of the clinical team. Their *actions* in management varied according to *context* and local protocols. RNs were usually the first clinician to assess and triage ED patients and were responsible for the monitoring of vital signs in ED and inpatient settings. All sepsis screening was either routinised, nurse-initiated based on clinical concern or in response to an automated sepsis alert. Automated alert systems required nurses to respond to and validate the alert by doing a rapid patient review and escalating accordingly. Automated sepsis alerts are an area of ongoing research and innovation to promote early identification of deterioration, prevent missed episodes of care and reduce sepsis mortality.^{47 48}

The *actions* of escalating care and communicating concern about patient deterioration and sepsis risk to the broader healthcare team were core RN responsibilities. This highlights the importance of earlier findings that a clinician's confidence in escalating concerns depends on both their own and others' perceptions of their competence in assessment and communication, as well as the psychological safety to speak up within multidisciplinary teams.^{49 50} Communication strategies and tools such as the mnemonic ISBAR and formulated scripts were described in several of the included studies.^{8 24 26 28 30 33 34 38-40} These tools helped to standardise how RNs communicated patient information in a succinct and systematic fashion and ensured optimal escalation and handover to medical and senior nursing staff. Simulation training was described as an effective strategy to improve communication and team-based responses to the deteriorating patient,^{28 29} highlighting the benefit of this initiative for healthcare teams.

RNs with sepsis care articulated as a designated component of their role were identified as key *actors*, whose *actions* included providing support for other RNs to escalate concerns and enabling timely sepsis interventions. This underpins the importance of clear specialist role nomenclature that ensures these nurses are visible as clinical resources within the multidisciplinary team.

In resource-restricted and/or socioeconomically deprived *contexts*, *actions* by RNs included a CCOT initiating rapid and comprehensive septic workups for patients meeting sepsis criteria.³⁸ Two other studies reported an expanded range of RN *actions* to meet clinical demand, including the authority to order chest x-rays and to initiate restricted-volume IVFs and antimicrobials.^{31 38}

Within the *actor* domain, sepsis coordinators, NPs, CCOT nurses and sepsis nurses were recognised as enablers that ensured any patient meeting sepsis criteria had a complete septic work-up and inpatient follow-up



of their sepsis care. A remote ICU nurse teleconsultation service was described as a helpful resource for ED nurses working in a rural hospital context.²⁸ Sepsis coordinators also provided feedback to clinical teams about adherence to local sepsis protocols and opportunities for quality improvement.

DEFINING ACTIONS AND CAPABILITIES OF NURSES IN SEPSIS CARE

The studies included in this review reported a wide range of nursing roles responsible for sepsis care. However, the impact of nursing contributions to sepsis care and patient outcomes cannot be fully assessed until specific role actions are clearly defined and linked to measurable indicators or outcomes. Further work is needed to explore the benefits of developing and implementing nursing roles dedicated to the management of sepsis, defining the capabilities required and the scope of nurses' practice. Furthermore, clear role definition can support multidisciplinary sepsis care and collaboration, appropriate utilisation of team skills and capabilities to enhance patient safety.⁵¹

Nursing roles described in the included studies lacked detail about what additional training was undertaken or required to enable them to deliver timely, evidence-informed sepsis care. Only one study³⁸ provided this information, describing a dedicated sepsis RN role that required a minimum of 1 year working as an ED nurse and comprehensive onsite training (provided by the organisation) in the management of patients with sepsis and septic shock. Overall, data available demonstrated a lack of consistency relating to the *actions* undertaken by nurses, hampering the opportunity to robustly evaluate the impact and contribution of nurses providing sepsis care.

Future research

Mapping extracted data from the papers to the AACTT framework has identified several opportunities for future studies investigating the contribution of RNs to sepsis care:

1. What skills and capabilities do nurses need to deliver patient-centred, safe, evidence-informed sepsis care?
2. What are nurse-sensitive indicators of effective sepsis care?
3. What are nurse-sensitive outcomes for early recognition and management of sepsis?
4. What are system-level indicators of effective nursing sepsis care?

Strengths and limitations

To our knowledge, this is the first scoping review to examine and describe the roles and responsibilities of RNs in sepsis recognition and management to an implementation framework. This approach has highlighted important findings, including the breadth and heterogeneity of actions undertaken by RNs across diverse roles and settings in sepsis care; and a lack of clarity regarding

training and capabilities required by nurses working in roles where sepsis is an integral action (responsibility) of their work.

This review has limitations that need to be considered when reading the findings. Consistent with the permissions of a scoping review approach, there are significant variables relating to the study designs, the number and type of study participants, the clinical contexts and the limited definition of key nomenclature such as 'early sepsis care' that limit the generalisability of evidence available to describe the roles of RNs in sepsis care. Nevertheless, this review provides a broad overview of *actions* of RNs in sepsis care and offers important insights to strengthen the evidence base through future research. There is both an opportunity and a need to develop a comprehensive, system-wide approach to nurse-initiated and nurse-delivered sepsis care. This should include curriculum development, targeted education and training, and national standardisation of levels of sepsis care that clearly define the scope of practice and responsibilities of the 'all, many, some and few' nurses involved in sepsis management.

CONCLUSION

Using an implementation science approach and the AACTT framework, this review mapped the roles and responsibilities of registered nurses in the early recognition and management of sepsis. The findings demonstrate that nurses perform a diverse set of actions that are driven not by clearly defined scope of practice or standardised competencies, but by contextual factors and resource availability.

In an era of healthcare where the worldwide burden of sepsis is unacceptably high and there is compelling evidence supporting early recognition and management as key strategies to prevent patient deterioration, the contribution of nurses is of paramount importance. This contribution may be of even greater benefit in resource-restricted settings and communities enduring the brunt of socioeconomic disadvantage. It is therefore essential that the leadership potential and capabilities of nurses are developed and supported to optimise equitable, safe, evidence-informed sepsis care delivery at a global level.

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