

Experiences of Sepsis among First Nations Peoples in Australia

A scoping review using an integrative methodology

Final report

August 2025

safetyandquality.gov.au

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Working In Partnership

IPS Management Consultants are working in partnership with the Australian Commission on Safety and Quality in Health Care (the Commission) to improve recognition of sepsis in First Nations peoples.

Acknowledgement

This report was created on Wurundjeri Woi Wurrung Country.

IPS Management Consultants acknowledges the Traditional Owners and Custodians of Country throughout Australia, and their continuing connection to land, water, and community. We pay our respects to Elders both past and present, and we extend that respect to all First Nations people.

In this document, the term 'First Nations' is used to describe both Aboriginal and Torres Strait Islander peoples of Australia. It does not include other First Nations peoples outside of this geographical area, unless stated otherwise.

We are grateful to the Aboriginal and Torres Strait Islander people and communities we have the privilege of working with, for sharing stories, values, beliefs, and culture.

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Introduction

In Australia, over 55,000 people are diagnosed with sepsis every year. More than one-quarter of sepsis cases result in death and almost half of all survivors are left with a disability or impaired function. This makes sepsis a leading cause of morbidity and mortality in Australian hospitals (AIHW (Australian Institute of Health and Welfare), 2024; Li et al., 2020; Schlapbach et al., 2019a, 2020a).

In response to sepsis, the Australian Government provided funding to the Australian Commission on Safety and Quality in Health Care (the Commission) to establish the National Sepsis Program, working in close partnership with The George Institute for Global Health (TGI) and Sepsis Australia. In 2023, the Australian Government, Department of Health and Aged Care (the Department) extended the program to improve the early detection and treatment of sepsis by delivering five new projects that address recommendations in the Stopping Sepsis National Action Plan (The George Institute for Global Health & Australian Sepsis Network, 2017):

- A targeted national public awareness campaign
- Education and training resources for health professionals and undergraduate health programs
- Coordinated sepsis care and post sepsis support for sepsis survivors and families, including those bereaved by sepsis
- Data collection tools for quality improvement
- Improving sepsis recognition in First Nations peoples.

The Commission continues to work in partnership with TGI and Sepsis Australia to extend the National Sepsis Program.

First Nations increased risk of sepsis

In Australia, compared with non-First Nations peoples, First Nations peoples have substantially lower life expectancy and experience a disproportionately higher burden of disease. First Nations peoples bear the greatest burden of disease; a finding that can be partially attributed to the prevalence and impact of chronic disease (diabetes, kidney disease, chronic obstructive pulmonary disease (COPD)) and sociodemographic disadvantage (AIHW (Australian Institute of Health and Welfare), 2022).

First Nations people are at greater risk of developing sepsis (Thompson et al., 2021). To reduce the prevalence and impact of sepsis on First Nations peoples this literature review aims to identify and synthesise what is already understood about recognising, responding to and improving sepsis outcomes in First Nations peoples.

In this review, the following assumptions apply:

1. racism and racial discrimination are consequences of colonisation, systematic oppression, exclusion and disempowerment and are associated with the negative impacts of health and wellbeing ([Truong & Moore, 2023](#))
2. social and emotional wellbeing are inextricably linked to broader social determinants including poverty, unemployment and lack of safe housing (Tujague, 2021).

Methodology

This section comprises two parts. The first involves developing the search strategy from existing health and wellbeing frameworks and the second applies the approach identified to the database search.

Search strategy

First Nations peoples conceptualise health and wellbeing based on holistic and relational processes which include access to services, traditional health practices and social determinants of health.

This literature review has been informed by several existing health and wellbeing frameworks to leverage work that has already been conducted to promote Aboriginal and Torres Strait Islander health and wellbeing. The frameworks used for this review were:

- Aboriginal and Torres Strait Islander Health Performance Framework (Australian Institute of Health and Welfare & National Indigenous Australians Agency, 2024)
- National Strategic Framework for Aboriginal and Torres Strait Islander Peoples' Mental Health and Social and Emotional Wellbeing 2017-23 (Department of the Prime Minister and Cabinet, 2017)
- New South Wales Aboriginal Health Plan 2024-2034 (NSW Department of Health, 2024)
- Aboriginal Health Plan 2021-2031 (Northern Territory Health, 2021)
- Aboriginal Health Plan 2024-2028 (SA Health, 2023)
- National Aboriginal and Torres Strait Islander Health Plan 2021-2031 (Department of Health, 2021)
- Balit Murrup. Aboriginal social and emotional wellbeing framework 2017-2027 (Victorian Department of Health, 2017)
- Making Tracks Together, Queensland's Aboriginal and Torres Strait Islander Health Equity Framework (Queensland Government & Queensland's Aboriginal and Torres Strait Islander Health Equity Framework, 2021)
- Western Australia Aboriginal Health and Wellbeing Framework 2015-2030 (Health et al., 2015).

Broad approaches for change identified in the reports included 'action areas', 'priority reforms' 'strategic directions', 'foundations for a healthy life' and 'domains'. From these broad descriptors of enabling change, three themes emerged: prevention, targeting at-risk populations and health system performance.

The search framework developed for this review is depicted in Figure 1, noting that a culturally informed evidence-based approach to identify at risk-populations will be identified through data, research and evidence.



Figure 1. Search framework

Medline search

Ovid Medline was selected to identify articles because searching functions enabling terminology to explode (**ex**) or focus (**fs**), which in turn, provides greater control over the search. Ovid Medline uses Medical Subject Headings (MeSH) as descriptors, which are divided into categories and subcategories and appear visually in a MeSH hierarchical structure.

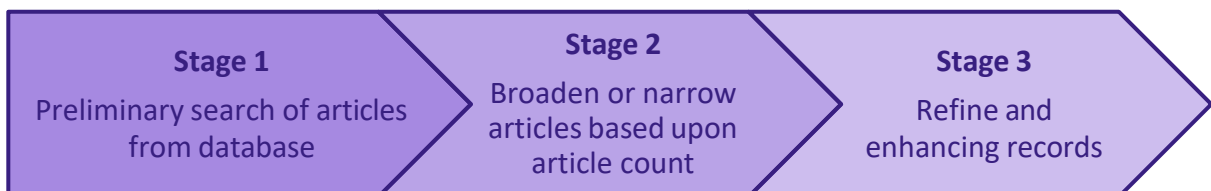


Figure 2. Approach to searching database

The search involved three steps (depicted in Figure 2):

Stage 1 involved conducting a preliminary search using the fundamental contexts for this review: the search terms included 'First Nations' and 'Sepsis'.

Stage 2 was conducted because there were few articles returned from Stage 1. The search terms were expanded to align with 'preventive action', 'at-risk populations' and 'healthcare system performance' in areas of Australia with high populations of First Nations such as Far North Queensland or Central Australia, which may or may not have been captured in Stage 1.

This search cast the net wider by searching for exploded terms (as listed in Table 1) in the context of geography (NSW, NT, WA, SA, Qld and SA) AND sepsis.

Stage 3 involved manually assessing the articles for relevance, particularly in the Australian context. In addition, relevant articles identified from previous searches, were included in the literature review.

Table 1. Stage 2 description applying exploded terminology to MeSH search terms

Geography + sepsis	MeSH search terms	Search description
	Population characteristics	Interaction between demographics, socioeconomic factors, health status, cultural or behavioural features, geographical data and special populations with geography/sepsis
	Anthropology Education, Sociology and Social Phenomena	Interaction between education, human activities and social sciences with geography/sepsis
	Psychology and Psychiatry	Interaction between behaviour and behaviour mechanisms, behavioural disciplines and activities, mental disorders and psychological phenomena with geography/sepsis
	Knowledge	Interaction between the body of truths or facts accumulated in the course of time, the cumulated sum of information, its volume and nature, in any civilisation, period, or country with geography/sepsis
	Resilience, psychological	Interaction between the human ability to adapt in the face of tragedy, trauma, adversity, hardship, and ongoing significant life stressors with geography/sepsis
	Co-morbidity/ epidemiological factors	Interaction between age factors, bias, causality, comorbidity, confounding factors, effect modifier, race factors, reproductive history and sex factors with geography/sepsis
	Risk and protective factors	Interaction between protective factors (under health care quality, access and evaluation) OR risk (an aspect of personal behavior or lifestyle, environmental exposure, inborn or inherited characteristic, which, based on epidemiological evidence, is known to be associated with a health-related condition considered important to prevent) with geography/sepsis
	Culture	Interaction between culture (A collective expression for all behavior patterns acquired and socially transmitted through symbols. Culture includes customs, traditions, and language – under Anthropology) with geography/sepsis

Attitude to health	Interaction between attitude to health (attitudes toward health, disease, and the medical care system) with geography/sepsis
Cultural diversity	Interaction between cultural diversity (coexistence of numerous distinct ethnic, racial, religious, or cultural groups within one social unit, organisation, or population – under anthropology) with geography/sepsis
Indigenous Health Services	Interaction between Indigenous Health Care Services (health care provided to specific cultural or tribal peoples which incorporates local customs, beliefs, and taboos) with geography/sepsis
Health services administration, health care quality, access and evaluation	Interaction between health services (services for the diagnosis and treatment of disease and the maintenance of health includes preventive health services) and health care quality, access and evaluation (the concept concerned with all aspects of the quality, accessibility, and appraisal of health care and health care delivery) with geography/sepsis

Results and analysis

The results of the Ovid Medline search are depicted in Figure 3, below.

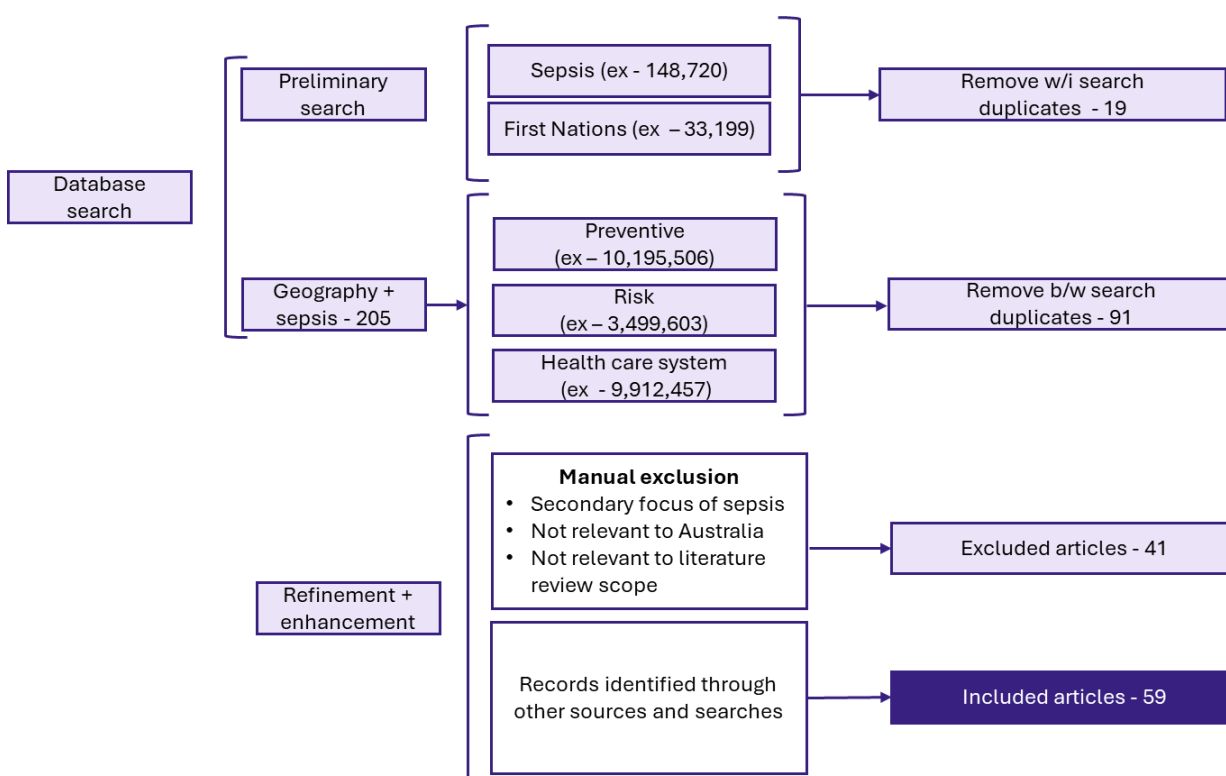


Figure 3. Search results (Ovid Medline)

Given the scope of the literature review, articles were manually assessed against each area of focus: recognition, response and outcome, where:

- **Recognition** was broadly defined as (pre-hospital) factors that improve public awareness and understanding about sepsis in the community. An epidemiological understanding of sepsis is necessary to inform the public about how to recognise

potential sepsis, risk factors and what to do when potentially faced with a person with sepsis.

- **Response** was broadly defined as factors influencing the response to sepsis in health care settings. An epidemiological understanding of sepsis will inform identifying potential case of sepsis, developing effective treatment protocols and monitoring drug resistance.
- **Outcomes** was broadly defined as factors that improve outcomes for First Nations peoples affected by sepsis. An epidemiological understanding of sepsis improves outcomes by understanding the various types of sepsis, disease trends and patterns and identifying high risk groups. This includes monitoring and evaluation of tools and treatments, improving sociodemographic risk, cultural alignment of policy and finding and implementing a national approach.

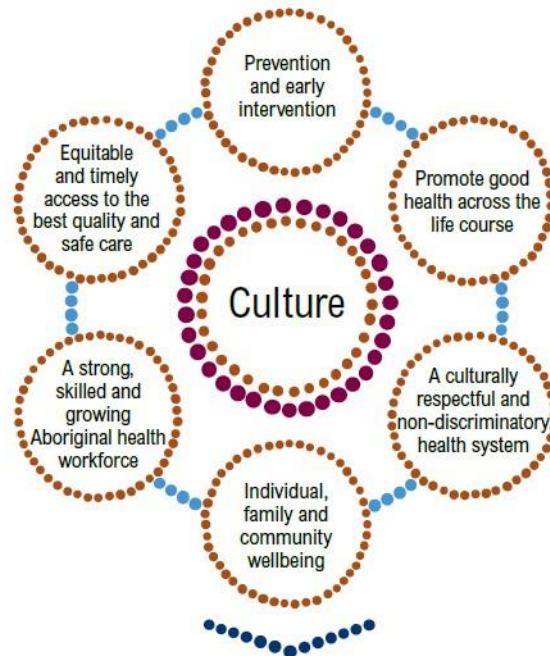
Confirmatory framework

The Western Australian *Aboriginal Health and Wellbeing Framework 2015–2030* (reproduced in Figure 4, below) identifies guiding principles, strategic directions and priority areas to improve the health and wellbeing of Aboriginal people in Western Australia. The Framework is used in this report to ensure that themes identified from the literature included the guiding principles and priority areas, as described by the Western Australian Government. Given the research associated with this literature review will be conducted in Western Australia, the state-based framework was considered to provide the most relevant context.

Guiding principles

- Cultural security ■ The health and wellbeing of Aboriginal people is everyone's business ■ Partnerships
- Aboriginal community control and engagement ■ Access and equality ■ Accountability

Strategic directions



Priority areas

- Addressing risk factors ■ Managing illness better ■ Building community capacity
- Better health systems ■ Aboriginal workforce development ■ Data, evidence and research
- Addressing the social determinants of health

Figure 4. WA Aboriginal Health and Wellbeing Framework 2015–2030

Findings

Fifty-nine (59) Australian articles were identified as relevant for this review, of which 10 were letters or editorials. Of the 59 articles, 19 (32%) were either focussed on First Nations peoples or included First Nations patients as a study group. The remaining articles were not specific to First Nations peoples but were selected because they fulfilled the location criteria.

Themes from the literature

The current literature review demonstrates the largely piecemeal approach to research about sepsis for First Nations peoples in Australia, where research is often replicated in some areas and sparse in others.

The overall message appears to be consistent. More research about sepsis in First Nations peoples is required to understand and reflect the situational, epidemiological and cultural complexities. There is need to fully embrace the complexity of sepsis in the context of First Nations peoples to identify opportunities to improve outcomes.

Detailed thematic findings identified from the literature are classified under three interrelated areas: recognition, response and improving outcomes.

Recognising sepsis

Public awareness of sepsis

Public awareness campaigns seek to inform and educate people about a topic or issue with the intention of influencing their attitudes and behaviours and beliefs towards the achievement of a defined purpose or goal. ¹

Communicating about sepsis

1. Culturally appropriate formats and languages (language scripts) can build trust and communicate messages effectively. This includes educational resources tailored to local languages and customs. There is a limited understanding about age-appropriate communication methods such as art, song, and dance to engage children, where literacy, languages and technology are limited. Early examples include artwork by [Sheri Skele](#) was created to symbolise the fight against sepsis and an animation on the “[Is it Sepsis?](#)” website that communicates symptoms and particularly the need to act quickly, in the words of a rap song.² The extent to which these approaches are successful in communicating about sepsis, is unknown (Harley et al, 2019; Schlapbach et al, 2017; Thompson et al, 2021).
2. Healthcare seeking behaviour is impacted by colonisation, the effects of which include multigenerational trauma, institutionalised racism and historical trauma. The pathways of racism to ill-health include psychological distress, depression, anxiety and engaging in health risk behaviours. Building trust is fundamental to improving healthcare seeking behaviour and improving communications between patients,



¹ Sayers, R. (2006). [Principles of Awareness Raising](#). UNESCO: Bangkok, p. 11-12.

² Based in the Northern Territory, T for Thomas (now, Is it Sepsis?) is a charitable service that aims to educate all peoples of all ages but focussed on First Nations peoples, people from a culturally and linguistically diverse background or living in rural/regional/remote communities about sepsis.

caregivers and healthcare providers will facilitate early sepsis diagnosis and treatment (Spaeth et al, 2024; van Bockxmeer et al, 2021).

3. Co-designing awareness campaigns with First Nations communities involves engaging with community leadership and adopting community-led strategies to create, disseminate information and support the prevention of sepsis. Community-controlled health services such as Aboriginal Community Controlled Health Organisation (**ACCHOs**) focus on prevention and early intervention and are staffed by members of the local community who understand personal, community and environmental factors that influence health. Co-designing with these organisations enables health care services to be delivered in ways that strengthen communities, respect culture and build capacity (Thompson et al, 2021).
4. Adopting a strengths-based approach to health highlights resilience and practices that provide additional protection during developmentally sensitive periods and across the lifespan. Attributes of a strengths-based approach include holistic perspectives, cultural relevance and community empowerment to strengthen collective identity to prevent healthy risk behaviour to promote wellbeing. This exists under the umbrella of self-determination, freedom from discrimination and the importance and value of First Nations cultures (Hanson et al, 2021; Schlapbach et al, 2019).
5. Literature identifies a need to invest in community and peer support services for sepsis survivors and their families. This involves seeking support from leadership through community-led initiatives and delivering culturally safe medical care that is not in conflict with First Nations beliefs, that would in turn establish the trust for post sepsis monitoring and assistance. (Basnayake et al, 2017; Spaeth et al, 2024; van Bockxmeer et al, 2021).

Targeting populations

6. There is some evidence to suggest that there is a lack of awareness of sepsis in First Nations communities. Information about sepsis should be made available and accessible to all First Nations peoples living in remote or rural communities and includes people well-placed for recognising potential sepsis such as parents, caregivers as well as other community members. A particular emphasis on awareness should be placed on community members at increased risk such as those with chronic conditions associated with sepsis (Peters et al, 2023; Schlapbach et al, 2020; Thompson et al, 2021).
7. The role of parental awareness, concern, risk perception, and recognition are critical when it comes to recognising children with potential sepsis. Despite the importance of parental concerns, there is no data determining its role in the clinical setting in the context of First Nations people, where contextual information may be limited. In addition, communicating concerns with medical staff should form part of the awareness program (Harley et al, 2019; Schlapbach et al, 2017).

Sepsis information

8. Sepsis is a time critical disease which progresses rapidly over time. Recognising and treating sepsis early are the best predictors of survival which means the message of timely treatment is prioritised when signs indicate a *possibility* of sepsis. This is particularly critical for people living in rural and remote communities (Palasanthiran et al, 2017; Romero et al, 2017).
9. Sepsis is also associated with a wide range of potential sources and modes of transmission, so it is critical that information about local contexts and practices and resources is incorporated into awareness campaigns. In response to a local increase in sepsis cases, it is essential that awareness materials are responsive to reflect this trend (Boyd et al, 2016; Palasanthiran et al, 2017).

Epidemiology of sepsis in a remote setting

Epidemiology is the study of how often a disease occurs in different groups of people and why. Epidemiological information is used to plan and evaluate strategies to prevent illness and as a guide to the management of patients in whom disease has already developed.³

Sepsis aetiology and pathogenesis

10. Sepsis is complex. Data consistently demonstrates the increased risk of sepsis for people living in remote areas, living in areas of socioeconomic disadvantage and First Nations peoples for rates of hospitalisation. Mortality and morbidity are associated with co-morbidities and septic source, age, delays in treatment and sociodemographic risk (Basnayake et al, 2017; Schlapbach et al, 2017).
11. Epidemiology/ pathogenesis of sepsis organisms vary across remote and rural areas in Australia and require a systematic approach to examine sepsis in First Nations populations. The literature describes the unique profile of causative pathogens and origins in tropical Australia and across states with high population rates of First Nations peoples. This information needs to inform local awareness campaigns. (Er et al, 2015; van Bockxmeer et al, 2021).
12. Co-morbid conditions such as diabetes, chronic kidney disease, cancer and cardiovascular diseases increase the risk of sepsis.
 - a. A strong primary healthcare level will improve management of these conditions and manage the risk of developing sepsis. Managing the severity of co-morbid conditions and their impact on sepsis risk identify the need for cross-disciplinary research aimed at improving reducing the risk of sepsis.
 - b. This understanding will also assist with stratifying risk and targeting education and awareness campaigns (Lwin et al, 2020; Ou et al, 2017).

³ <https://www.bmj.com/about-bmj/resources-readers/publications/epidemiology-uninitiated/1-what-epidemiology> (accessed 14/1/2025)

13. Socio-demographic risk factors increase the risk of sepsis. For example, social determinants of health in disadvantaged communities include household overcrowding, poverty, lower educational attainment link to other health risk factors such as smoking, alcohol consumption and insufficient physical activity. Investing in programs that enhance health literacy, reduce smoking and alcohol consumption and improve sanitation will ultimately benefit health and reduce the risk of sepsis (Coe et al, 2023; Schultz et al, 2023; Sullivan et al, 2020).
14. Precautionary behaviour may lower the risk of sepsis. For example, hand decontamination and hygiene are particularly important post-birth for reducing sepsis in First Nations infants and community perceptions of skin sores as normal and fear of injections may reduce the likelihood of hindering access to treatment (Pharande et al, 2018; Wright et al, 2022).
15. Epidemiological studies rely on the accurate coding of sepsis in administrative databases. A recent meta-analysis (Liu, 2022) identified that sepsis was under coded and coding was inconsistently applied. A [report](#) published by the ACSQHC identified changes in sepsis mortality rates that was explainable by changed ICD-10-AM coding practices for sepsis. Accurate and consistent coding practices must be enforced and managed for accurate trends of sepsis to emerge from data (Liu, 2022; Peri et al, 2023).

Life course risk

16. A holistic approach to healthcare delivery involves addressing the social determinants of health required to reduce sepsis burden. For example, preventing sepsis includes reducing the prevalence of preterm and low birthweight births by improving access to healthcare (Wright et al, 2022).
17. Determining risk factors in the context of developmental vulnerability will support an evidence-based approach to achieving a more targeted effort to improve health and wellbeing. For example, early and late onset sepsis in neonates present differently with diverse risk factors and presentations. The role of parental education and antenatal care for reducing risk factors of preterm and low birthweight births are more likely to be relevant preventive measures for late onset sepsis, but not to the same extent for early onset sepsis (Gowda et al, 2017; Wright et al, 2022).



Immunisation/Vaccinations

18. Immunisations vary in their effectiveness to reduce the risk of sepsis. While vaccinations are more effective for particular diseases, in particular age groups, this is not a universal finding. The preventive impact of immunisations also relies on First Nations children uptake, which is approximately 90% Australia-wide. In some patients, sepsis/septic shock involves a viral co-infection which highlights the importance of timely vaccinations in this population (Birrell et al, 2019; Er et al, 2015).

Responding to sepsis

Professional development

19. Levels of experience, perceptions and awareness amongst nurses varies in remote locations. During busy periods, there is insufficient time to assess patients thoroughly. These structural barriers contribute to delayed diagnosis of sepsis by doctors and nurses and is compounded by a lack of access to specialist staff working in remote locations (Harley et al, 2019, 2021; Kabil et al, 2021).
20. To place a greater emphasis on sepsis in nursing education, there should be a greater focus placed on training to better recognise and communicate the need for escalation to medical staff; training that should be supported by accreditation bodies (Harley et al, 2019, 2021).
21. Professionals who understand prevalent risk groups and behaviour, particularly in the area in which they are practising, are better informed to manage high-risk patients effectively. This extends to understanding the role for traditional healing to address infections; approaches that have not been integrated into clinical settings. While biomedical treatment is dominant, incorporating the role of traditional healing will strengthen engagement with the health system by community members. (van Bockxmeer et al, 2021).
22. The [NT Remote Locum Program](#) is a First Nations-led remote health workforce program that improves quality because it is culturally and locally responsive to the health needs of First Nations peoples. It provides health professionals (including general practitioners, registered nurses, dentists) to address short term work force shortages in remote Aboriginal communities. Training includes face to face cultural training, a cultural advisor and a remote educator. A recent [evaluation by Nous Group](#) identified opportunities for co-designing an enhanced model to meet the needs of remote communities in the NT. (Schlapbach et al, 2019).



Resources for professionals

23. Establish and implement nationally recognised clinical standards for the detection and treatment of sepsis in both adults and children.
 - a. Parents are experts in their child's behaviour and are well placed to provide information. Understanding the importance of early recognition of infections in children with cancer is well established. Parents are often regarded as instrumental players in their child's healthcare (Harley et al, 2019). Parental concern should be incorporated into the diagnostic criteria for sepsis.
 - b. Standardised protocols are shown to be important for recognising sepsis in First Nations people and minimising delays in treatment. However, protocol adherence should be monitored (Harley et al., 2019; Schlapbach et al., 2020).

24. General programs for managing sepsis tend not to have a specific First Nations focus, although some programs provide information about cultural awareness. General programs include Sepsis Kills (NSW Health), Sepsis Clinical Standard (Victoria, NT and ACT), Queensland Sepsis Program, Sepsis Pathway (South Australia), Sepsis Management Guidelines (WA) and Sepsis Care Pathways (Tasmania). The National Health Skin Guide is designed to help practitioners with diagnosing, treating and preventing skin infections but it is not clear whether this guide, or any others, are being used to manage sepsis in remote populations (Palasanthiran et al, 2017).
25. The Commission's 2020 ['Epidemiology of Sepsis in Australian Public Hospitals report'](#) identified a variability of sepsis clinical practical guidelines and pathways, sepsis education and promotion campaigns. The [National Sepsis Clinical Care Standard](#) (SCCS) was published in 2022. This incorporated information related to sepsis in First Nations peoples. The SCCS includes prompts about cultural awareness and safety and information about specific characteristics and factors influencing the context of First Nations peoples, such as the potential for multi-drug-resistant organisms. It is not yet known whether the SCCS has improved practice and made it more consistent across Australia-wide (Palasanthiran et al, 2017).
26. The Commission published the [User Guide](#) for Aboriginal and Torres Strait Islander Health, which details six actions to meet the needs of First Nations peoples within the National Safety and Quality Health Service (NSQHS) Standards. This is not a sepsis specific document however, it raises a number of the issues identified in the current literature review (Australian Commission on Safety and Quality in Health Care, 2017).
27. A 2019 [report](#) from Macquarie University in Sydney about risk identification tools for early detection of sepsis did not explore the reliability of the tools with First Nations peoples. It explored the tools across four rural districts, however there was no distinction about how effective the tools were in First Nations populations. The literature identified the need for sepsis assessment tools, biomarkers and pathways relevant to remote cohorts. This is particularly important given that not all screening tools are equally effective in estimating the proportion of patients who die with sepsis or septic shock in hospital (Ling et al, 2018).
28. Antimicrobial stewardship is important to reduce antimicrobial resistance and improve outcomes. The Commission has published a [report](#) on *Antimicrobial stewardship in the Aboriginal and Torres Strait Islander population*, which whilst focussing on infections, does not cover sepsis meaningfully. A number of articles identify increasing rates of antimicrobial resistance; however, this should be understood in the broader context of First Nations people, their culture and the sociodemographic factors affecting health (Gannon et al, 2024; Gibbs et al, 2024; Horcajada et al, 2024).
29. The [Northern Territory Government \(NT Health\)](#) produce an informative website which includes links to:

- a. Sepsis pathway documents that incorporate evidence-based risk criteria to assist clinicians with recognising and responding to sepsis for adults and children; and
- b. Sepsis guideline documents that support pathways and provide further guidance for acute and primary health care
- c. Online learning modules
- d. Resources for clinical nurse educator and medical officers
- e. Information for health professionals about adult and paediatric patients, neonatal patients, maternity patients and all patient cohorts
- f. Consumer resources (from the NT, National Website and Support Groups). (Northern Territory Government of Australia, 2025).

30. The [Queensland Government \(Queensland Health\)](#) produce an informative website which includes links to:

- a. Adult sepsis pathways
 - i. No antimicrobial guideline
 - ii. Low MRSA, Non-tropical with antimicrobial guideline
 - iii. High MRSA Non-tropical with antimicrobial guideline
 - iv. High MRSA Tropical with antimicrobial guideline
- b. Adult Sepsis Pathway Flowchart
- c. Staff education resources including factsheets, videos and e-learning modules
- d. Resources for patients, families and carers
- e. Adult Sepsis Primary Healthcare Screening Tool. (The State of Queensland (Queensland Health), 2024).

Similar information exists for paediatric sepsis. To the extent they have not already, specific approaches such as those adopted in the NT and Qld, should be considered by all Australian states and territories.

Cultural context

First Nations workforce

31. Enabling a First Nations workforce by supporting training and education will create and sustain a culturally relevant and responsive workforce. This has the potential to make a positive impact on education and employment opportunities for First Nations peoples as well as supporting the multicultural approach to patient needs. First Nations people are better placed to use an approach that incorporates First Nations and Western knowledge systems. This is likely to require system modifications to remove barriers for accessing training and education, particularly in remote communities as it is more likely to result in sustainable change. Rural workforce initiatives such as scholarships for First Nations students are required to Close the Sepsis Gap (van Bockxmeer et al, 2021).



Culturally appropriate and trauma informed care



32. Cultural competence in non-First Nations medical staff creates trust and rapport with patients. Overseas research shows that inequitable health care due to racism and bias is well documented and the impact is not well understood (McGrath et al., 2023).
33. Australian literature emphasises the important role of culturally appropriate prevention strategies and respectful practices facilitate better health outcomes. Similarly, the role of trauma-informed care for medical and allied health professionals is critical to providing culturally safe practice and improving patient compliance. For this to truly make an impact it is important that all medical staff understand history of trauma and its link with sociodemographic disadvantage and adverse health outcomes (Tujague & Ryan, 2021).

Integrated healthcare services

34. Coordination of partnerships with the health sector is important for improving accessibility and patient experience for First Nations peoples. Integrated services include:
 - a. Aboriginal Community Controlled Health Organisations (ACCHOs) provide culturally informed services that impact on social determinants of health. ACCHOs are responsive and highlight competing demands in a complex and adaptive health system (Beks et al., 2023).
 - b. Telehealth. A recent [review](#) of telehealth services used in Australia, identified barriers to its effective use such as privacy and confidentiality issues, limited broadband availability and low health and digital literacy. However, there is limited understanding about whether clinical outcomes improve when compared with clinic attendance (Couch et al., 2021). The service has promise to provide culturally appropriate care for First Nations peoples.
 - c. Royal Flying Doctor Service provides free emergency evacuations and health care services for people living in remote communities. In its latest [report](#), *Best for the Bush*, clarity around the definition of 'reasonable access' and a targeted plan for rural and remote primary health care is needed from the Australian Government. Further funding is required to support primary healthcare and health promotion initiatives for rural and remote Australians (Bishop et al., 2024).
 - d. The [Integrated Team Care](#) Program provides coordinated care for First Nations peoples with chronic conditions. It links patients with care coordinators and outreach workers who help navigate the healthcare system.
 - e. Point of care testing is a potential solution for risk-stratification of new patients guiding initial treatment (Oeschger et al., 2019). In Australia, there is a lack of availability of point-of-care testing devices to measure blood lactate levels. This is used to stratify risk in emergency room patients and is particularly useful in remote locations.

Improving outcomes

Monitor and evaluate outcomes on an ongoing basis

35. Understanding the epidemiology of sepsis will inform the development of a public health approach for sepsis. Monitoring public health outcomes includes measuring:
- a. clinical outcomes, such as incidence, morbidity and mortality
 - b. health outcomes such as re-admission rates
 - c. societal outcomes such as changes to Quality of Life and impact on caregivers. Sepsis survivors face long-term physical, cognitive, and psychological effects, with a lack of coordinated follow-up services in Australia (Peri et al, 2023).
36. Monitoring public health outcomes creates an evidence base to:
- a. use data to inform change
 - b. understand antimicrobial resistance and improve antimicrobial stewardship
 - c. improve early detection and treatment
 - d. identify trends and allocating resources
 - e. identify differences between the epidemiology of sepsis across Australia. (Viennet et al, 2014).

Policy and funding to improve accessibility to quality health care

37. In the Northern Territory, many remote primary care services are located more than 500 km from a pathology laboratory and have limited access to transport for pathology samples. First Nations peoples should have physical access to quality health care within their cultural system and without having to leave their community and family. A limited medical workforce, clinics and specialist care is not easily found in communities and this isolation is a significant barrier to receiving timely health care (Spaeth et al, 2024; van Bockxmeer et al, 2021).
38. Reducing the impact of sociodemographic risk through well designed policy is aligned with community health and wellbeing and plays a pivotal role for accessing good health. Good environmental health should be achieved across the life course which includes maternal health and parenting, childhood health and development, adolescent and youth health to healthy adults and healthy ageing (Basnayake et al, 2017; Ou et al, 2017; Thompson et al, 2021).



Implement a national approach

39. To properly co-ordinate preventive efforts against sepsis, the WHO recommends establishing a nationally coordinated sepsis body to develop and promulgate a national action plan for sepsis. A systematic approach is more likely to identify and manage the many complexities associated with seeking assistance for sepsis by First Nations peoples. Given the existing differences between states and locations, an overarching national awareness campaign may be more suited to communicating similarities where local differences in sepsis prevention, recognition and outcomes

may be better targeted based upon relevance (Basnayake et al, 2017; Schlapbach et al, 2019; Schultz et al, 2023).

40. Knowledge and awareness of sepsis varies between rural and remote locations compared with major cities and between states. A national approach will also incorporate differences that creates a standard and consistent way coding sepsis for public health records (Schlapbach et al, 2019).
41. The National Sepsis Program has produced the following papers and reports. Noting, although these reports have not been compiled under the National Sepsis Program extension period, some contain information, albeit limited, about the First Nations context.
 - a. [Epidemiology of Sepsis in Australian Public Hospitals](#)
 - b. [National Retrospective Medical Record Review](#)
 - c. [Sepsis trigger tools systematic review](#)
 - d. [Materials to support implementation of National Safety and Quality Health Service Standards \(NSQHS\)](#)
 - e. [Revision of the Antimicrobial Stewardship Clinical Care Standard](#)
 - f. [Sepsis Clinical Care Standard](#)
 - g. [Public Awareness Campaign](#)
 - h. [Sepsis Survivorship](#).
42. The National Sepsis Program has produced several awareness resources targeting First Nations people. See posters, patient information sheets and a YouTube video in Figure 5 (below). In addition, there has been an information [publication](#) for clinicians, describing an implementation case study to deliver better sepsis care in a remote Northern Territory community. (Australian Commission on Safety and Quality in Health Care, 2022).

	
Signs and symptoms of sepsis - poster for Aboriginal and Torres Strait Islander peoples	'Could it be Sepsis?' - poster for Aboriginal and Torres Strait Islander peoples
	
'Could it be Sepsis?' - Patient information brochure for Aboriginal and Torres Strait Islander peoples	Signs and symptoms of sepsis – YouTube video (presented with male and female voiceovers)



'Spotlight on Sepsis' video provides key information about sepsis, its signs and symptoms and simple ways to reduce the risk of falling ill with sepsis.

Figure 5. National Sepsis Program awareness resources

Strengths and limitations

43. The integrative review was conducted with methodological rigour and based on Dhollande's et al (2021) paper and used Western Australia Aboriginal Health and Wellbeing Framework to confirm the holistic picture identified from the literature. Regular consultation was sought from the Commission and TGI to ensure the literature review was meeting expectations with respect to timeline and methodology.
44. Many studies undertaken in the context of infections occurring in First Nations peoples were excluded from the study as these did not extend to sepsis necessarily. The findings of the infection literature may have equally applied or enhanced the current literature review, but were ultimately considered out of scope.

Conclusion

This review identified themes appearing in the literature related to recognising, responding and improving outcomes for sepsis in First Nations peoples.

For recognising sepsis, key themes centred around the need to build trust and relationships with First Nations people and incorporate traditional knowledge and ways of communicating to empower communities to recognise and swiftly respond to the possibility of sepsis. Given the historical context of colonisation and the multigenerational effects of trauma, co-designing awareness campaigns with First Nations communities provides one of several approaches to communicating about sepsis.

Awareness campaigns must be informed by the best available information and research that is focused on sepsis occurring in First Nations peoples and/or in areas with high rates of First Nations residents. This is contingent on accurate coding practices which need to be consistently applied in hospitals and medical centres, to fully understand the periods of high risk, infection trends and changes to the epidemiology of sepsis that could impact on treatment and prognosis.

Key themes around responding to sepsis were focused on recognising the need for professional development and clinical resources to assist professionals with identifying and managing sepsis.

Recruiting and supporting First Nations teams will create and sustain a culturally relevant and responsive workforce.

Online resources available to support medical staff varies between states and territories and could be improved.

Structural issues such as busy periods, lack of the specialist staff and communication between staff were also raised as important factors in addition to the need for culturally and trauma-informed care.

The need for integrated health services that improve accessibility to medical facilities is critical to improving outcomes. This requires ongoing and continual monitoring of public health outcomes and developing well-designed policy that reduce the impact of sociodemographic risk.

Project implications

The current literature review was written to support the work of a project that forms part of the National Sepsis Program Extension, aimed at improving the recognition of sepsis. The project aims to establish an authentic, qualitative evidence-based, reflective stories and experiences of First Nations people affected by sepsis. In addition, key stakeholders, comprising medical and non-medical professionals, will provide their experiences and expertise of sepsis in First Nations communities. The findings of this literature review will inform the questions posed to First Nations peoples and other key stakeholders. It is anticipated that project findings will inform recommendations that improve sepsis recognition in First Nations communities.

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Appendix 1. Table of findings

Key findings and messages from the 59 articles are detailed for recognition, response and outcomes, in Table 2.

Table 2. Classification table of findings from articles (n=59)

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
(Kaukonen et al., 2014)	Mortality Related to Severe Sepsis and Septic Shock Among Critically Ill Patients in Australia and New Zealand, 2000-2012	Retrospective review		These findings were accompanied by changes in the patterns of discharge to home, rehabilitation, and other hospitals.	Hospital outcomes for patients within and without sepsis have improved over time. Causes of improvement are unclear. Mortality has decreased over time even after adjustments for illness severity, centre effect, regional effects, hospital size, risk of being septic, and other key variables.	No	ICU patients with severe sepsis	ALL
(Macdonald et al., 2014)	Comparison of PIRO, SOFA, and MEDS Scores for Predicting Mortality in Emergency Department Patients With Severe Sepsis and Septic Shock	Observational study (2010 – 2013)		Severity scoring for sepsis has implications for patient disposition and outcomes. There are implications for identifying and managing high risk patients.	Need to understand comorbidities and septic source to predict mortality.	No	Sepsis cases in ED in metropolitan Perth hospitals	WA
(Middleton et al., 2014)	Invasive group A streptococcal infection in the Northern Territory, Australia: Case report and review of the literature	Case report	High rates of <i>Group A Streptococcus</i> in First Nations people in the Northern Territory. Severity and high transmissibility of <i>Group A Streptococcus</i> .	Need guidelines for administering prophylactic antibiotics. The use of prophylactic antibiotics to eradicate risk in high-risk populations (including household members).	<i>Group A streptococcus</i> is associated with high morbidity and mortality. Notifiable disease to monitor incidence and prevalence of <i>Group A streptococcus</i> in the community. Better understanding of transmissibility of infection.	Yes	First Nations twins living in a remote NT community	NT
(Viennot et al., 2014)	Epidemiology of dengue in a high-income country: a case study in Queensland, Australia	Retrospective review (1995 - 2011)	High rates of transmission of dengue fever/major health threat in Northern Queensland from travellers. Increasing numbers of locally acquired cases.		Epidemiology to identify high risk areas, target interventions and transmissibility. Minimise delay in notification to improve public health response for outbreak.	No	Data from Cairns Public Health Unit, Queensland Health	QLD

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
			Understanding the differences between the epidemiology of locally acquired cases, imported cases and cases without origin.		Enhance surveillance of adult travellers from South East Asia and Papua New Guinea.			
(Er et al., 2015)	Paediatric bacteraemias in tropical Australia	Retrospective review (2001 - 2010)	Infections vary with location and time and vaccinations.	Considering the increasing prevalence of MRSA, empiric treatment for sepsis for children in this region needs to be reconsidered. The high contamination rate of blood cultures warrants monitoring to reduce contamination.	Unique profile of causative pathogens in tropical Australia. Bloodstream infections are important causes of paediatric morbidity and mortality. False positive blood cultures increase costs, hospital stays and unnecessary antibiotic therapy.	No	Children in tertiary hospital in North Qld	QLD
(Marmont et al., 2015)	Clinical outcome following sepsis due to bacteraemia in patients using glitazones: a matched case control study	Matched case control study		Study of alternative medications for treatment of bacteraemia.	Further studies warranted to improve outcomes.	No	Adults in Brisbane tertiary hospital	NSW
(Queensland Nurses Union, 2015)	Reflective exercise: Issues for nurses highlighted at the inquest into infection deaths	Professional development		Need policy regarding escalation and regular review. Need a standardised approach. Need policy to access off-site clinicians for case deterioration/ supporting professional practice. Need to ensure documentation records actions. Need clinical/professional judgement and tools to guide decision making.		No	Inquest into infection deaths	QLD
(Simpson, 2015)	Issues for nurses highlighted at the inquest into infection deaths	Professional development		Consistent tools to assess deterioration. Understaffing (regional hospitals) and doctor availability to attend. Communicating concerns with on-call doctors and pathology.		No	Inquest into infection deaths	QLD

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
				Assumptions about symptoms (e.g. haemoptysis) must not be made and acted on immediately. Consistent access to radiology services.				
(Wisdom et al., 2015)	INITIAT-E.D.: Impact of timing of INITiation of Antibiotic Therapy on mortality of patients presenting to an Emergency Department with sepsis	Retrospective observational study (2012)	Emphasise delays in sepsis management and administration of antibiotics has detrimental outcomes.	Delays in antibiotic administration often occur within the emergency department. Researching the role of early antibiotic therapy in a generalised emergency department is required.	Delays may result in increased mortality risk in patients with severe sepsis.	No	Sepsis patients in ED at Flinders Medical Centre	SA
(Boyd et al., 2016)	High burden of invasive group A streptococcal (GAS) disease in the Northern Territory of Australia	Case series retrospective (2011-2013)	Identify high risk groups such as people with chronic medical conditions such as renal disease is more common in First Nations peoples. Higher incidence of <i>Group A Streptococcus</i> in First Nations peoples and this is amplified in patients with haemodialysis.	Determine the effectiveness of chemoprophylaxis. Increased risk for haemodialysis patients – should be targeted for preventing infection transmission.	Outcomes and clinical course were similar regardless of First Nations status where deaths were associated with chronic medical conditions. <i>Invasive Group A streptococcus</i> places a significant burden on individuals, communities and healthcare system. Effectiveness of chemoprophylaxis to inform public health response.	Yes	Residents reported to the NT Notifiable Diseases System	NT
(Burrell et al., 2016)	SEPSIS KILLS: early intervention saves lives	Prospective comparison cohort		Management program in hospitals to promote skills and knowledge needed for recognising and managing patients with sepsis in emergency departments. Earlier antibiotics associated with reductions in trends in mortality, hours in intensive care and mean length (days) of hospital stay.		No	ED hospital admissions with sepsis	NSW
(Ostrowski et al., 2017)	The burden of invasive infections in critically ill Indigenous	Retrospective multi-centre cohort study (2002 – 2013)	Further research is needed to define risk factors.	Develop and assess appropriately targeted interventions.	ICU admission for severe infections was several times higher for First Nations compared with non-First Nations children particularly for <i>S aureus</i> infections.	Yes	All children less than 16 years admitted to an ICU in Australia	ALL

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
	children in Australia				While intensive care unit fatality rates were similar, the population-based mortality was more than twice as high for First Nations children. The study highlights an important area of inequality in health care for First Nations children.			
(Ou et al., 2016)	Incidence and mortality of post-operative sepsis in New South Wales, Australia, 2002–2009	Retrospective study			Mortality from post-operative sepsis decreased, but its incidence rate increased, resulting in a lack of improvement in the incidence rate of sepsis-related deaths. The increasing incidence of postoperative sepsis and the poor record of identification of causative organisms remain a significant public health challenge.	No	Adult elective surgical admissions and public acute care hospitals	NSW
(Basnayake et al., 2017)	The global burden of respiratory infections in Indigenous children and adults: A review	Observation comparison study	Commonalities for First Nations peoples include poorer health and socioeconomic disadvantage. Understanding the socioeconomic, environmental and biological risk factors.	Culturally safe healthcare practices, improving child health, ensuring timely and appropriate treatment. Adaptive measures e.g. pre discharge to predict outcomes for people geographically isolated from health care. Respiratory infections are more severe resulting in poorer outcomes.	Awareness of the scope of the problem by healthcare practitioners, governing bodies and policy makers. Risk mitigation strategies delivered in a culturally appropriate way should be targeted to individuals and communities.	Yes	First Nations and non-First Nations children with respiratory infections	ALL
(Cleland et al., 2018)	Paediatric invasive <i>Haemophilus influenzae</i> (HI) in Queensland, Australia, 2002–2011: Young Indigenous children remain at highest risk	Retrospective review	Young First Nations children remain at highest risk. Incidence is higher in First Nations than non-First Nations children. Limited impact of immunisation against <i>Haemophilus influenzae</i> .		<i>Haemophilus influenzae</i> remains a significant cause of mortality and morbidity in Australian children. Interventions to address differences in social environment, access to health care and health education need to be developed.	Yes	All cases of invasive <i>H. Influenzae</i> disease in children identified by pathology results	QLD
(Gowda et al., 2017)	Late-onset Neonatal Sepsis—A 10-year Review From North	Retrospective case review	Understanding epidemiology of late-onset sepsis in neonates admitted from the community.	Neonatologist must promote the rational use of antibiotics including the optimal choice of drug and duration of therapy.	Late onset sepsis contributes significantly to mortality and morbidity in neonates and remains a challenge to clinicians.	Yes	Neonates aged between 3 and 28 days	QLD

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
	Queensland, Australia			Consider the type of organism (e.g. Gram positive, Gram negative, CONS [coagulase negative staphylococcus] and Staphylococcus aureus. Definitions of CONS is problematic.	Understanding neonates at greatest risk of late onset sepsis and its recurrence.			
(Ou et al., 2017)	The impact of post-operative sepsis on mortality after hospital discharge among elective surgical patients: a population-based cohort study	Retrospective cohort study (2007 – 2012)	Epidemiology of post operative sepsis. Risk factors for increased risk of death includes age and severity of co-morbidities.		Mortality impact on post-operative sepsis. Post-operative sepsis remained independently associated with a higher mortality risk at 30, 60 and 90 days. Greatest risk of decline in survival occurs in first month. Strategies targeting the first month after discharge should be considered. Developing new policy initiatives in providing better coordinated care for these patients and managing this shifted care burden.	No	Elective surgical patients	NSW
(Palasanthiran & Bowen, 2017)	The excess burden of severe sepsis in Indigenous Australian children: can anything be done?	Editorial	Reducing the transmission of <i>Staphylococcus aureus</i> and early treatment are key factors to improving outcomes. The excess burden on infection reflects the social determinants of health in disadvantaged communities where household overcrowding, poverty and limited access to healthcare result, in poor health outcomes. Skin control programmes are important in regional and remote Australia or improving the recognition treatment and prevention of skin infections in First Nations children. Immunisation is crucial for reducing sepsis by vaccine preventable infections such as <i>Streptococcus</i>		Individual and community level strategies for reducing the burden of Staphylococcus aureus infections warrants further investigation.	Yes		

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
			<i>pneumoniae</i> and <i>Neisseria meningitidis</i> .					
(Romero et al., 2017)	The impact of evidence-based sepsis guidelines on emergency department clinical practice: a pre-post medical record audit	Retrospective comparison study		Guidelines for clinician decision making to support best practice. Comorbidities such as aging, declining cognitive function may challenge assessments and decision-making processes. Early assessment, recognition and management of sepsis can be improved, including earlier administration of antibiotics. Australasian Triage Scale is a clinical tool is designed to ensure patients presenting to the emergency departments are seen in a timely manner. This results in embedding a 'sepsis bomb' within the patient information system.	The use of evidenced-based guidelines can impact clinical decision-making and behaviour, resulting in the translation and support of best practice and improving patient care. Further research is required to better understand how sepsis guidelines have influenced triage nurse decision making and altered behaviour (behaviour change and adherence).	No	Adults with sepsis in ED	NSW
(Schlapbach et al., 2017)	The excess burden of severe sepsis in Indigenous Australian children: can anything be done?	Letter	Education to increase community awareness of the disease in high income countries to facilitate early medical treatment has received less attention. The impact of socioeconomic status on morbidity and premature mortality has been demonstrated to be comparable with that of other major health risk factors such as smoking, insufficient physical activity, hypertension and alcohol consumption.	Severity of paediatric sepsis, such as the degree of organ failures, is closely related to the time to initiation of antimicrobial treatment and fluid resuscitation.		Yes		
(Smith et al., 2017)	Children with melioidosis in Far North Queensland are commonly bacteraemic and have a high case fatality rate	Observational study (1998 – 2017)	Paediatric melioidosis is uncommon in Far North Queensland and has a less benign clinical course than those reported in Northern Territory.	Clinicians should only prescribe empirical regimens covering <i>Burkholderia. pseudomallei</i> in children if they have a high clinical suspicion. Delayed ICU admission and poor physiological reserve resulting from socioeconomic disadvantage almost	More or less virulent strains of melioidosis warrants further investigation.	No	Children with culture confirmed <i>Burkholderia. Pseudomallei</i>	QLD

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
				certainly contributed to their poor outcomes.				
(Heldens et al., 2018)	Sepsis incidence and mortality are underestimated in Australian intensive care unit administrative data	Prospective cohort		Not all screening tools are equally effective in estimating the proportions of patients who die with sepsis or septic shock in hospital.	ANZICS CORE criteria significantly underestimate the incidence of sepsis and overestimate the incidence of septic shock; in-hospital and lower mortality rates. An accurate, reliable, and reproducible method is needed to determine the incidence and mortality rates of sepsis and septic shock in Australian ICUs.	No	Patients admitted in ICU and assessed for sepsis	NSW
(Lobo et al., 2018)	A research and evaluation capacity building model in Western Australia	Qualitative evaluation	Generate local evidence and highlight local issues of importance for consideration at the national level.		The role of ongoing monitoring and evaluation of public health strategies is important to achieving success. Partnerships between public health researchers, service providers and policymakers can help address evaluation knowledge and skills gaps. Consider evaluation plans early in planning process. Stronger engagement between public health researchers, service providers and policymakers through collaborative partnerships has the potential to improve evidence generation and evidence translation.	No	Participants actively engaged with SiREN (Western Australian Sexual Health and Blood-borne virus Applied Research and Evaluation Sector)	WA
(Munro et al., 2018)	Infection characteristics and treatment of <i>Staphylococcus aureus</i> bacteraemia at a tertiary children's hospital	Retrospective review (2011-2013)	Epidemiology and risk factors are poorly understood in children with <i>Staphylococcus aureus</i> bacteraemia.	Characterise severity of disease such as simple and complex disease may guide decision making. Wide spectrum of paediatric disease resulting in different laboratory presentations, length of stay and duration of therapy.	Need to characterise infection to validate severity classification for clinical trials and improve targeting future clinical trials.	No	Children admitted to hospital with <i>Staphylococcus aureus</i> bacteraemia	WA
(Pharande et al., 2018)	Trends in late-onset sepsis in a neonatal intensive care unit following	Prospective surveillance (2002-2016)		Care bundles have been shown to reduce infection rates in neonatal intensive care units.	Identify and evaluate the impact of infection control measures.	No	All neonates admitted to the NICU	NSW

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
	implementation of infection control bundle: A 15-year audit			Most important influencing change was the cultural change resulting from the continuing education, feedback and implementation and reinforcement of best infection control practices. e.g. hand hygiene and compliance and the role of multidisciplinary improvement teams.	Late-onset sepsis is a major cause of mortality and morbidity in preterm neonates.			
(Udy et al., 2018)	Timing of antibiotics in the management of community-acquired sepsis: Can a randomised controlled trial of prehospital therapy provide answers?	Review paper		Guidelines to minimise delay of empirical therapy are required. Tension with microbiological resistance. Some advocate for culture-driven approach to antibiotic prescription. Controlled data is urgently needed to determine the impact of empirical therapy.		No		
(Birrell et al., 2019)	Characteristics and Impact of Disseminated Gonococcal Infection (DGI) in the “Top End” of Australia	Retrospective case review (2010 – 2018)	Different presentation compared with Central Australia. Prevent disease by directing strategies to health and wellbeing and sexual health awareness to young people in the remote Top End. In liaison with community health services and schools, investment in culturally appropriate STI prevention strategies in this population has the potential to be very cost-effective, in addition to the marked individual health benefits for patients.	Knowledge of disease burden among the health services accessed. Understanding possible explanations for different presentations include strains, genetic immune factors, delayed presentation and predisposing comorbidities.	Urgent action in the health and community sector is required, particularly for at-risk populations, to prevent further debilitating and costly complications of gonococcal infection. Long term morbidities and complications are possible. Research required to determine efficacy of vaccinations and burden of disseminated gonococcal infection in the Top End of Australia where young, remote First Nations peoples are at greatest risk.	No	Patients diagnosed with proven, probable and possible DGI identified from health records	Top End NT
(Harley, Latour, et al., 2019b)	The Role of Parental Concerns in the Recognition of Sepsis in Children: A Literature Review	Literature review	Sepsis is a time critical disease. Limited understanding of knowledge about recognising sepsis in the community. Role of parents in decision making may impact on survival of child with sepsis. No data on the role of parental concerns.	Outcomes strongly depend on appropriate treatment in hospital. Parental concern should be a trigger in sepsis screening tools. Need to determine sensitivity and specificity of diagnostic value.		No		

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
(Harley, Johnston, et al., 2019)	Emergency nurses' knowledge and understanding of their role in recognising and responding to patients with sepsis: A qualitative study	Qualitative interviews		Organisational situational factors (e.g. volume, triage system, acuity of patients). Knowledge and clinical urgency allowing for escalation. Staff supervision and awareness of staff experience and the need to seek advice. Nursing education programs and system modifications need to be promoted and addressed.		No	ED nurses	QLD
(Schlapbach et al., 2019b)	The WHO resolution on sepsis: what action is needed in Australia?	Opinion	Lack of awareness of sepsis in the community. Burden of sepsis: Australian estimates and gaps in accurate reporting. Response to sepsis in First Nations communities must be holistic and culturally respectful and use a needs-based approach to improving health and wellbeing.	Lack of awareness of sepsis in the health care workforce. Hospitals should have protocol for early identification and immediate management of patients with sepsis. All health care professionals receive training in the recognition of sepsis. Coordinated national approach that addresses pre-hospital and in-hospital recognition and treatment, and the significant and neglected post-discharge needs of sepsis survivors, is likely to reap greater benefits at a lesser cost.	Australia needs a coordinated nationwide plan to reduce preventable deaths and disability from sepsis. Sepsis survivors suffer physical, cognitive and psychological sequelae which affect their wellbeing and that of their families and carers for decades. Currently, there are no coordinated follow-up services in Australia to address the needs of thousands of sepsis survivors and their families. Challenges specific to sepsis in neonates and children incur high direct and indirect healthcare costs associated with societal impact.	No		
(Hanson et al., 2020)	The applicability of commonly used predictive scoring systems in Indigenous Australians with sepsis: An observational study	Retrospective observational study (2014 – 2017)	Need to examine sepsis in First Nations peoples systematically. Interventions at a community level including efforts to facilitate access to care, reduce crowding, enhance health literacy, improve sanitation and ensure appropriate nutrition are likely to be most helpful. At a primary health level optimising management of conditions like diabetes that predispose to sepsis and ensure comprehensive vaccination, particularly for those at high risk are also likely to assist.	Far North Queensland has unique blend of infectious diseases – leptospirosis, melioidosis and rickettsial disease. MRSA is highest reported in the country. Community controlled health services focus on prevention, early intervention and comprehensive care, may be the best suited to deliver care. Services are frequently provided by members of the local community	First Nations patients die at a much younger age compared with non-First Nations peoples but scoring systems predict similar mortality.	Yes	Consecutive First Nations and non-First Nations adults admitted to Tertiary referred hospital	QLD

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
			Expanded programmes to assist with smoking cessation and encourage alcohol moderation are also essential.	who have a greater understanding of the personal, community, and environmental factors influencing the health of the people and are therefore may be more likely to provide effective care.				
(Lwin & Bannan, 2020)	A retrospective observational study on enterococcal bacteraemia and endocarditis at a regional hospital in New South Wales, Australia	Retrospective observational study (2012 – 2018)	Understanding demographic characteristics, co-morbidities (renal insufficiency, malignancy, abnormal urinary tract, biliary tract, transplant, presence of prosthetic valve or intra-cardiac device and diabetic mellitus) and clinical outcomes in a rural setting.	Problems relating to increasing antibiotic resistance and rising numbers of health care related infections associated with <i>Enterococcal</i> infection in a rural setting.	High morbidity and mortality associated with <i>Enterococcal</i> bacteraemia and endocarditis.	No	Hospitalised patients with <i>Enterococcal</i> bacteraemia and endocarditis	NSW
(Schlapbach et al., 2020c)	World Sepsis Day: a global agenda to target a leading cause of morbidity and mortality	Editorial		Need better access to appropriate rehabilitation services for all patients and families with sepsis worldwide. Improved public and professional understanding and awareness of sepsis.	More accurate measurement of the global burden of sepsis and the impact of sepsis control and management interventions needed. Increased sepsis survival rates across all age groups in all countries through the promotion and adoption of early recognition systems and standardised emergency treatment.	No		
(Sullivan et al., 2020)	2020 Review and revision of the 2015 Darwin melioidosis treatment guideline; paradigm drift not shift	Retrospective cohort study (2012 – 2017)	Melioidosis, caused by the Gram-negative bacterium <i>Burkholderia pseudomallei</i> . Better understanding risk factors/co morbid conditions in First Nations peoples.	Best practice needs to evolve and reach consensus to formally incorporate changes into revised guidelines.	Review melioidosis guidelines to improve clinical practice.	No	Patients presenting with first episode, culture-confirmed melioidosis	NT
(Laupland et al., 2022)	<i>Pasteurella</i> species bloodstream infections in Queensland, Australia, 2000–2019	Population study			The incidence of <i>Pasteurella</i> species blood stream infection was highest in recent years and older individuals were at greatest risk. 97% were community onset cases.	No	Patients with first episode culture confirmed <i>Pasteurella</i> species blood stream infection	QLD

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
(Hanson et al., 2021)	Melioidosis—a disease of socioeconomic disadvantage	Cohort comparison study (1998 – 2020)	Melioidosis is disease of socioeconomic disadvantage (e.g. younger, female, Indigenous, diabetic and renal disease).		A more holistic approach to the delivery of healthcare which addresses the social determinants of health is necessary to reduce the burden of this life-threatening disease.	Yes	Patients with a positive blood culture for <i>B. pseudomallei</i> in the hospital laboratory	Far North Qld
(Harley et al., 2021)	Final year nursing student’s exposure to education and knowledge about sepsis: A multi-university study	Online survey		Understand education of healthcare workers related to exposure and knowledge of sepsis. The knowledge of final year nursing students in relation to recognising, escalating and managing sepsis was limited. There is an urgent need to design education which safely prepares nurses for challenges with sepsis, particularly paediatric sepsis. Accrediting bodies should consider mandating inclusion of sepsis education as part of all nursing programmes.		No	Final year nursing students	QLD
(Kabil et al., 2021)	Emergency nurses’ experiences of the implementation of early goal directed fluid resuscitation therapy in the management of sepsis: a qualitative study	Qualitative interviews		Factors inhibiting the implementation of protocols were nurse perceptions and experience, clinical practice challenges and strategies to improve compliance.		No	Registered ED nurses	NSW
(Thompson et al., 2021b)	Incidence and outcomes of sepsis in Aboriginal and Torres Strait Islander and non-Indigenous residents of New South Wales: population-	Prospective cohort study (2006 – 2009)	Culturally appropriate community led strategies targeting chronic disease prevention and social determinants of health may reduce the gap between indigenous and non-Indigenous Australians. Co-design awareness campaigns with Indigenous communities.		Higher hospitalisation rate in NSW or First Nations adults. Preventing readmission is a priority for all Australians given the reasons for sepsis admissions were similar. The difference in hospitalisation rates is partially explained by underlying differences in	Yes	Sepsis cases identified from hospital records and were followed for hospitalisation for sepsis	NSW

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
	based cohort study				sociodemographic factors, health behaviour and comorbidities. Once hospitalised with sepsis accounts for age, there was no difference in the severity of disease between First and non-First Nations patients.			
(van Bockxmeer et al., 2021)	Closing the sepsis gap: an exploration of sepsis presentations at a remote north Australian emergency department	Retrospective cohort analysis (2010 – 2016)	Understanding aetiology of sepsis in remote communities. Barriers to hospital presentation include multigenerational trauma, institutionalised racism and reduced trust in healthcare services. Wide range of potential sources of sepsis, a whole of health approach addressing the social determinants of health may help reduce the elevated burden of communicable diseases in First Nations peoples. Build trust through culturally safe practices. Identify system factors responsible for sepsis gap in order to understand and close it.	Presentation and pathogenesis of sepsis against standardised criteria varies with First Nations and non-First Nations peoples. Need to improve access to culturally safe medical care. Develop sepsis assessment tools, biomarkers and pathways relevant to remote cohorts. Educate community providers. First responders communicate in local languages to identify sepsis and early source of control of common infections.	No difference in mortality between First Nations and non-First Nations peoples. Improve access to health care delivery including telehealth and rural workforce initiatives. Advocate local, state and federal governments and health agencies to Close the Sepsis Gap. Collaborate and seek support from WHO and Australian Sepsis recommendations.	Yes	All adult patients presenting the Hedland Health Campus ED with clinician diagnosed sepsis	WA
(Blythe et al., 2022)	Patient and economic impact of implementing a paediatric sepsis pathway in emergency departments in Queensland, Australia	Pre and post comparison cohort study			Results indicated a paediatric sepsis pathway in Queensland emergency departments was associated with potential reductions in hospital utilisation and costs due to ICU related costs and providing clinicians with the opportunity to treat other patients.	No	Children diagnosed with ICD-10 coded sepsis and admitted via ED to hospitals in Queensland	QLD
(Donaldson et al., 2022)	Outcomes following severe septic shock in a cohort of Aboriginal and Torres Strait Islander people: a nested cohort	Nested cohort and matched comparison study			First Nations peoples had reduced risk of death at 90 days when compared with non- First Nations peoples. Similar outcomes when compared with matched cohort.	Yes	All First Nations patients recruited to the Adjunctive Corticosteroid Treatment in Critically Ill patients with	NT

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
	study from the ADRENAL trial						Septic Shock (ADRENAL)	
(Harley et al., 2022)	Challenges in the recognition and management of paediatric sepsis — The journey	Discussion paper	Systematic approaches to recognising sepsis, recognition of sepsis by parents and in the pre-hospital environment.	The role of nurses, families, paramedics and nurses in recognising and managing paediatric sepsis remains an under-represented area in current literature.	There is need for a unified approach to care, as outlined in the Australian National Action Plan for sepsis. Need to focus on community, pre-hospital, and post-sepsis care.	No		
(Salaveria et al., 2021)	The Applicability of Commonly Used Severity of Illness Scores to Tropical Infections in Australia	Retrospective case report analysis (1999 – 2020)		Overestimation of case fatality rates are indicated by SOI scores for leptospirosis, melioidosis and rickettsial disease in Far North Queensland.		No	Adults admitted to ICU with a laboratory confirmed diagnosis of melioidosis, leptospirosis and rickettsial infection	QLD
(Wright et al., 2022)	Epidemiology of early and late-onset neonatal sepsis in an Australian regional special care nursery with a high proportion of Aboriginal and Torres Strait Islander births	Retrospective cohort study (2012 – 2016)	Risk factors for First Nations infants include premature birth and low birthweight. This places infants at increased risk of neonatal sepsis. Prevent premature birth and low birthweight infants in First Nations populations. First Nations infants have similar rates of early onset sepsis compared with non-First Nations infants. First Nations infants have five times higher rates of late onset sepsis compared with non-First Nations infants. Adjustments for prematurity and low birth rate, rates of late onset sepsis were similar. Improve hand hygiene and reduce high rates of ‘inadequate antenatal care’ for First Nations peoples.		Rates of early and late-onset neonatal sepsis were low, but case fatality was high.	Yes	Infants with blood or cerebrospinal fluid cultures with organism growth	Top End NT
(Bowker et al., 2023)	Incidence and outcomes of critical illness in Indigenous	Systematic review			Research on First Nations peoples experience with critical care is	Yes		

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
	peoples: a systematic review and meta-analysis				poorly characterised and has rarely included First Nations perspectives.			
(Coe et al., 2023)	Bloodstream infection rates in Aboriginal and non-Aboriginal people in Central Australia, 2014–2018	Letter	Higher rates of bloodstream infection rates in social disadvantage, chronic disease and harmful alcohol consumption, overcrowded housing and poor sanitation. Increasing incidence of <i>Streptococcus pyogenes</i> and MRSA. 34% of the disparity in health outcomes between Indigenous and non-Indigenous Australians is attributed to high levels of unemployment, lower educational attainment and household income, and inadequate housing. A further 19% is attributed to health risk factors, including alcohol consumption and smoking.			Yes		
(Gilholm et al., 2023)	Validation of a paediatric sepsis screening tool to identify children with sepsis in the emergency department: a statewide prospective cohort study in Queensland, Australia	Prospective multicentre study		Screening tool had good predictive performance of identifying sepsis in children. Implementation of sepsis screening tools may improve the timely recognition and treatment of sepsis.		No	Twelve ED settings in Qld	QLD
(Laupland et al., 2023)	Bloodstream Infection and Colorectal Cancer Risk in Queensland Australia, 2000-2019	Population based cohort study (2000 – 2019)	Colorectal cancer is a risk of bloodstream infection. Improved understanding of the epidemiology of bloodstream infection in these groups is required.			No	Patients with colorectal cancer identified with blood stream infection diagnosed with positive blood cultures	QLD

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(Peri et al., 2023)	Bloodstream infections in neutropenic and non-neutropenic patients with haematological malignancies: epidemiological trends and clinical outcomes in Queensland, Australia over the last 20 years	Observational study (2000 – 2019)		Understanding the epidemiology of sepsis is essential to guide patient management and especially when immune status is compromised in patients. Importance of managing antimicrobial resistance which improves outcomes for patients.	Outcomes are dependent upon understanding the immune profile of patient. Improve clinical data collection to improve outcomes.	No	Patients diagnosed with blood stream infections in pathology cultures	QLD
(Schults et al., 2023)	Evolving insights into the epidemiology of <i>Moraxella</i> species bloodstream infection from two decades of surveillance in Queensland, Australia	Population cohort-based study (2000 – 2019)	<i>Moraxella</i> species bloodstream infection is poorly defined due to their rarity. Understanding epidemiology of <i>Moraxella</i> species in Australian population is required. Infants (<1 year) are at highest risk but further research is required to better understand how health behaviours, cardiovascular risk factors, comorbidities and geography play a role in bloodstream infection. Knowledge of these factors will improve preventive programs and identify people at increased risk of infection.	Improve primary care infrastructure to support accessibility and equity of access across geographical locations.		No	Patients admitted to hospital with <i>Moraxella</i> species infection	QLD
(Wilks et al., 2023)	Impact of 1-hour and 3-hour sepsis time bundles on antibiotic use in emergency departments in Queensland, Australia: a before-and-after cohort study	Cohort comparison study		The use of an ED sepsis screening tool and management bundle was associated with an improvement in the rates of appropriate antibiotic prescription and fewer dosing errors.	Outcomes associated with rates of appropriate and optimal antibiotic prescription.	No	Patients presenting in ED with confirmed bacteraemia	QLD
(Peters et al., 2023)	Sepsis awareness and understanding in	Online survey questionnaire	Assess parental awareness and understanding of childhood sepsis	Parental education should target knowledge gaps to improve healthcare-seeking behaviour and		No	Parents responding to the National	ALL

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
	Australian parents: A National Child Health Poll survey		and what to do if sepsis was suspected in their own child. Considerable knowledge gaps in parental awareness and knowledge of sepsis.	communication between parents and healthcare providers in order to facilitate early sepsis diagnosis and treatment.			Child Health Poll	
(Donaldson et al., 2024)	Sepsis associated acute kidney injury is common among Aboriginal and Torres Strait Islanders with septic shock and has poor outcomes: A nested cohort study	Nested cohort and matched comparison study	High incidence may be linked to baseline risk factors such as chronic kidney disease, hypertension and diabetes.	Measures to promote better management of infectious diseases in First Nations communities are required.	Understanding incidence and outcomes associated with sepsis in patients with acute kidney injury is limited.	Yes	First Nations patients recruited to the Adjunctive Corticosteroid Treatment in Critically Ill patients with Septic Shock (ADRENAL) trial	NT
(Gannon et al., 2024)	Neonatal early-onset sepsis calculator: Impact on antibiotic use in a level II neonatal unit in Western Australia	Retrospective cohort study		Evaluate the Kaiser Permanente neonatal EOS calculator to reduce antibiotic usage. Compare antibiotic administration rates without deaths or adverse outcomes representing an improvement in antimicrobial stewardship.		No	All live births $\geq$ 35 weeks gestation	WA
(Gibbs et al., 2024)	Trends in Enterobacterales Bloodstream Infections in Children	Cohort study (2000 – 2019)	They occur more commonly in children with comorbidities.	Increasing rates of antimicrobial resistance in children.	Increasing incidence of <i>Enterobacterales</i> blood stream infection due to <i>Salmonella sp.</i> and <i>E. coli</i> organisms. Poor characterisation of infection in Australian children. Need antimicrobial and vaccine trials.	No	Clinical cases identified from positive blood cultures	QLD
(Hargovan et al., 2024)	Indigenous Australians critically ill with sepsis: Characteristics, outcomes, and areas for improvement	Retrospective cohort comparison study	First Nations patients were more likely to be younger and have chronic morbidities such as type 2 diabetes, cardiovascular disease, renal disease and more likely to engage in smoking and excess alcohol consumption.		Unique cohort characteristics may explain outcomes, and assist clinicians, researchers and policymakers in targeting interventions to these characteristics to best reduce the burden of sepsis in the cohort and improve healthcare outcomes.	Yes	Consecutive sepsis admissions to hospital ICU	QLD

Author (year)	Title	Evidence	Recognition	Response	Outcomes	First Nations focused	Sample	State
					First Nations peoples died younger in ICU and 2000 days post discharge compared with non-First Nations peoples.			
(Horcajada et al., 2024)	<i>Pseudomonas stutzeri</i> bloodstream infection is a prevailing community-onset disease with important mortality rates: results from a retrospective observational study in Australia	Retrospective observational study (2000 – 2019)		Increased awareness required for <i>Pseudomonas stutzeri</i> . Antimicrobial resistant strains were not identified.	Mortality was high in patients with respiratory infectious source. Describe the incidence, epidemiology, antimicrobial resistance rates, and outcomes of <i>Pseudomonas stutzeri</i> bloodstream infections.	No	Laboratory surveillance cohort study of <i>P. stutzeri</i> in the publicly financed healthcare system	QLD
(Spaeth et al., 2024)	Point-of-care testing for sepsis in remote Australia and for First Nations peoples	Letter	Negative effects of colonisation. Socioeconomic inequity.	Lack of access to culturally safe and appropriate healthcare. Delay in recognising sepsis due to multimorbidity and accessing healthcare. First Nations peoples need healthcare tools to detect sepsis in their remote communities. Point-of-care testing devices provide rapid pathology results for chronic and acute conditions in remote northern and central Australia. This is important for informing monitoring and clinical management of patients.	Increased burden of communicable and non-communicable diseases. Point of-care test will promote health equity.	Yes		