

# Point-of-care testing for sepsis in remote Australia and for First Nations peoples



In Australia, over 55,000 people are diagnosed with sepsis every year<sup>1</sup>. More than one-quarter of sepsis cases result in death and almost half of all survivors are left with a disability or impaired function<sup>2</sup>. Populations most at risk of sepsis mortality in Australia are the young, the old, and First Nations peoples (Aboriginal and/or Torres Strait Islander peoples)<sup>2</sup>. The disparity in excess sepsis risk is most evident in rural and remote locations and in northern Australia.

The disproportionate risk of sepsis for First Nations peoples, like other health inequities, is linked to challenges associated with accessing healthcare services and the negative effects of colonization, including socioeconomic inequity and the lack of access to culturally safe and appropriate healthcare<sup>1,3,4</sup>. The resultant increased burden of communicable and non-communicable diseases experienced by First Nations peoples, combined with high rates of multimorbidity, can disguise the signs of sepsis. Recognition and treatment of sepsis are therefore often delayed, placing individuals at increased risk of sepsis-related death and disability<sup>1</sup>. Shifting deficit narratives away from health inequities requires consideration of structural drivers of health outcomes, including accessible healthcare appropriate to community needs. First Nations peoples therefore need appropriate healthcare tools to assist in the detection of life-threatening illnesses such as sepsis within their remote communities.

One such tool, used successfully for more than two decades in remote First Nations communities, is point-of-care testing. Point-of-care testing devices provide rapid pathology results for a range of chronic and acute conditions in remote northern and central Australia and empower informed monitoring and clinical management of patients<sup>5</sup>. A point-of-care test that measures lactate, a commonly used biomarker to assist with sepsis detection as an indicator of organ dysfunction, has been embedded into primary care sepsis pathways to improve the detection of sepsis and accurate triage of patients. However, as lactate is a non-specific marker of acute illness, it is not itself diagnostic of



**Fig. 1 | Point-of-care testing in remote Australia.** The photo shows a typical emergency department in a remote primary health care clinic in the Northern Territory of Australia, featuring various point-of-care testing devices.

sepsis and additional biomarkers of infection and inflammation are needed to improve diagnostic specificity.

The full blood count (FBC) pathology test includes a white cell count (WCC) and platelet count, both of which are used as biomarkers of sepsis and infection. The WCC is a component of the systemic inflammatory response syndrome (SIRS), which has long been used as a screening test for sepsis<sup>6</sup>. The platelet count is a component of the sequential organ failure assessment (SOFA) score, which was originally proposed to assess the severity of sepsis and the response to treatment<sup>7</sup> and is now used to define organ dysfunction in the most recent consensus definition of sepsis<sup>8</sup>. However, until recently, point-of-care tests for WCC and platelets have not been widely available and have been limited to use within tertiary settings with immediate access to a laboratory. The FBC is a routine test and can be used to assess general health and a variety of disorders that affect blood cells and is the

most requested laboratory test in Australia (12.8 million tests per annum)<sup>9</sup>, with a large proportion of requests originating from primary care. Unfortunately, owing to vast distances and long travel times between remote First Nations communities and pathology providers, timely and reliable FBC testing is often not accessible, or practical, in remote primary health care in Australia.

For example, in the Northern Territory (NT) of Australia, many remote primary care services are located more than 500 km from a pathology laboratory and have limited access to transport for pathology samples. The NT is an Australian territorial region situated in the central and northern areas of the country, with a land area of 1.4 million km<sup>2</sup> (almost six times the size of the UK) and a relatively small resident population of around 230,000 people. First Nations peoples account for 30% of the NT population, and 70% of the NT population living in remote and very remote locations at least 50 km from any hospital level service<sup>4</sup>.

In remote areas of NT, health care is predominantly provided by NT government-funded health centres and Aboriginal Community Controlled Health Services; the latter are primary health care services initiated and managed by the local community to deliver holistic, comprehensive and culturally appropriate health care. These centers provide primary care services such as general practitioner and allied health consultations, but also function as remote emergency triage departments (Fig. 1). They are staffed by a range of health professionals, doctors (either onsite or external), nurses and Aboriginal Health Practitioners who provide culturally responsive primary health care. In the NT, First Nations peoples are four times more likely to be affected by and die from sepsis than non-Indigenous Australians (40.8 per 1,000, 5.7% mortality)<sup>10</sup>. Given that sepsis most often originates in the community setting, it is within these remote primary care facilities that tools for the early detection and treatment of sepsis have the greatest potential to provide benefit.

The Australian Government has funded a team of investigators, via the Medical Research Future Fund's (MRFF) Primary Health Care Research initiative, to collaboratively test whether using a FBC point-of-care testing device (HemoScreen, PixCell Medical Technologies) can build on the substantial point-of-care testing expertise within remote NT primary care centers and its workforce, with the aim to improve sepsis detection in a cost-effective and culturally appropriate way. The team will embed the WCC and platelet count biomarkers into existing primary care sepsis pathways. In addition to sepsis, the FBC test, or subsets thereof, form key components

of many clinical care pathways for conditions that disproportionately affect First Nations peoples, such as anemia, chronic kidney disease and respiratory infections. Therefore, the test will also be made available for the care of any patient for whom it may influence clinical care, with this study collecting data on the category and number of clinical conditions, other than sepsis, in which the FBC test provides a clinical, operational, or cultural benefit.

It is hoped that the availability of the point-of-care FBC test for a variety of clinical care pathways will contribute to improved health outcomes for First Nations peoples in remote Australia and thereby promote health equity. This approach to strengthen health systems may also improve health service efficiency and reliability, while improving the experience of health care delivery for remote patients.

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## Competing interests

The authors declare no competing interests.