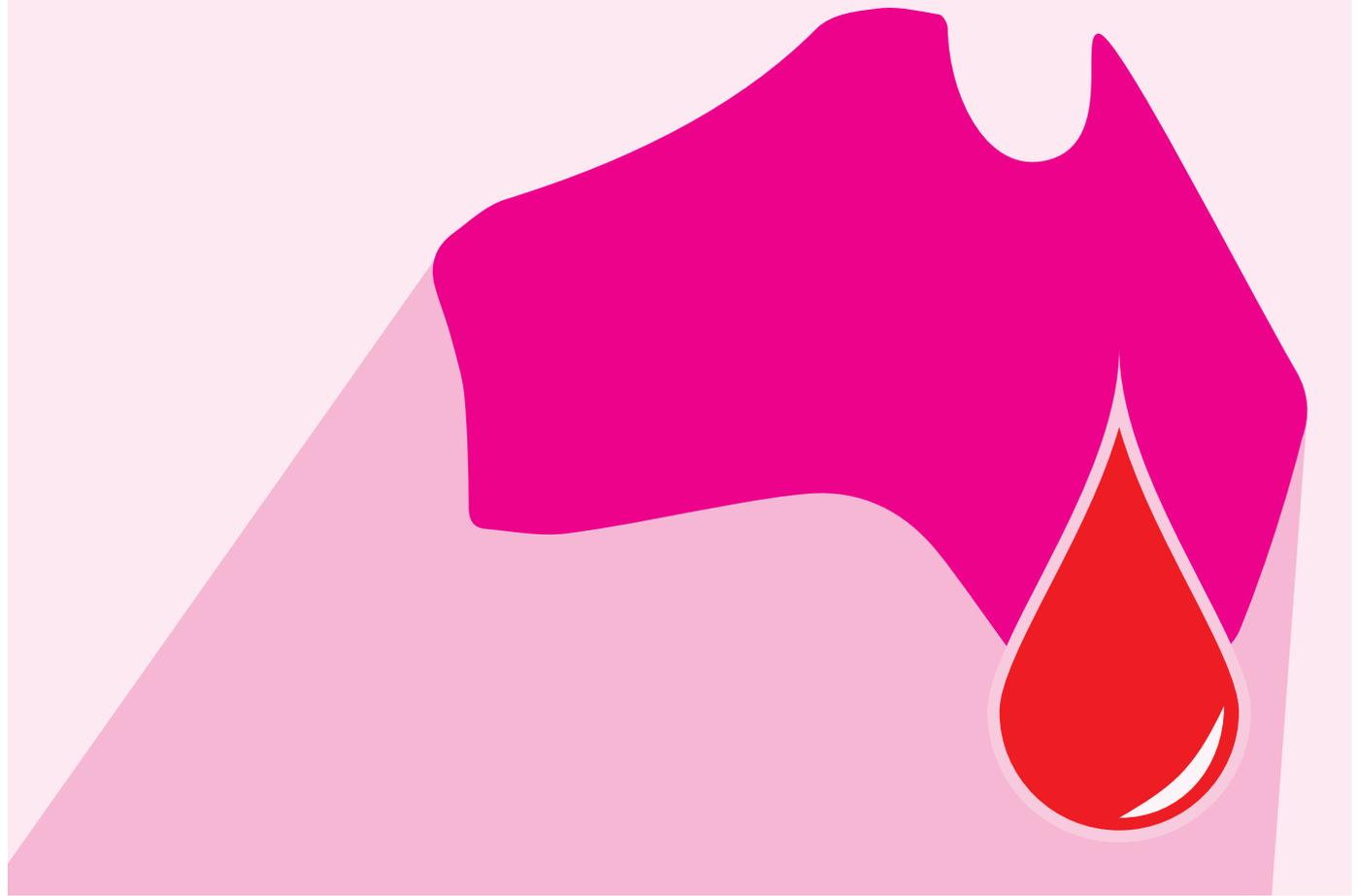


Stopping Sepsis:

A National Action Plan



A health policy report
December 2017



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Introduction



The need for an action plan

Sepsis is a life-threatening illness that occurs when the body's response to infection injures tissues and organs. Over 18,000 Australians suffer from sepsis every year, 5000 of those affected will die, and of those who survive, half are left with a disability or impaired function. Sepsis costs an estimated \$846 million to treat in Australian Intensive Care Units (ICU) annually; the total economic cost is not currently known but is estimated to exceed AU\$1.5 billion. Sepsis has lasting effects on survivors, and their families.

The current global estimate of hospital-treated sepsis is 30 million episodes and six million deaths annually. This is likely a significant underestimate, as most sepsis deaths are attributed to the underlying infection, and are therefore not accurately counted.

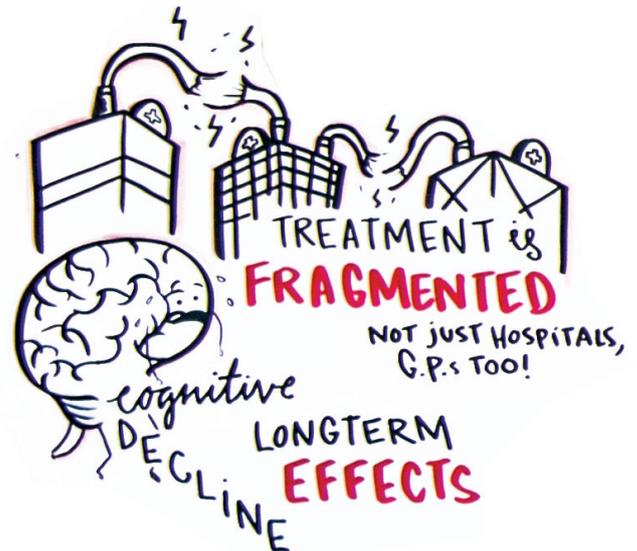
In May 2017, the World Health Assembly at the World Health Organization (WHO) recognised sepsis as a global health priority by formally adopting a resolution to improve the prevention, diagnosis and management of sepsis around the world. The resolution calls on all United Nations member states to take specific actions to reduce the burden of sepsis, including implementing national action plans, in collaboration with professional and patient-advocacy groups. The resolution, with its implicit recognition of sepsis as a major global public health threat, has the potential to save millions of lives. National sepsis action plans would:

- Address low public and healthcare worker awareness of sepsis;
- Improve the International Classification of Diseases coding of sepsis, resulting in the accurate recording of the burden of sepsis;
- Reduce deaths and disability caused by sepsis by implementing standard and optimal care via appropriate guidelines; and
- Encourage monitoring of progress toward improving outcomes for patients and survivors over time.

The actions proposed in the WHO resolution require coordinated efforts by healthcare providers, consumers, administrators, researchers and government across

a broad healthcare landscape. Countries around the world are formulating nationally coordinated action plans that aim to reduce the burden of sepsis. This report seeks to identify key next steps in creating a national action plan for Australia with the same goal.

About sepsis in Australia



As is the case in many countries, the Australian approach to sepsis prevention and care across the health system is fragmented. Some states and territories have successfully implemented, or are in the process of developing, sepsis programs and care pathways. However, there is either little national coordination or no clinical standard of care for healthcare professionals. Further, the public are largely unaware of the symptoms of sepsis and of the importance of seeking urgent medical care when symptoms occur. There is also a lack of understanding on the part of healthcare workers, including primary care physicians, of the personal, societal and financial burden for those who survive sepsis.

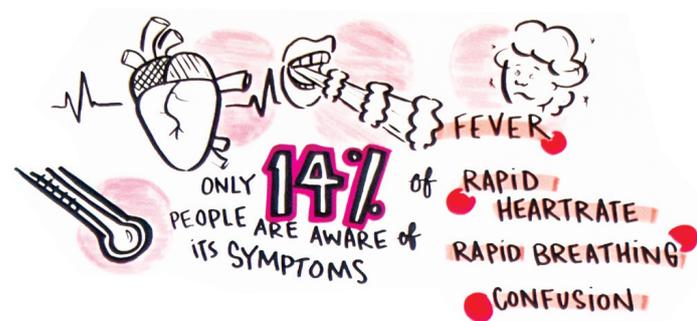
An estimated 18,000 Australian adults are treated in an ICU for sepsis annually, and over one quarter of these patients, almost 5,000 people, will die, resulting in more than twice the number of deaths caused by road traffic accidents each year. Sepsis can affect individuals from any segment of society, however some groups are at



greater risk than others. The life-time risk of suffering from sepsis is highest during early childhood, resulting in a disproportionate impact of sepsis on children and infants. Half of all recorded paediatric sepsis cases in Australia, and one-third of paediatric sepsis deaths, occur in previously healthy children. The burden of sepsis is also far higher in Aboriginal and Torres Strait Islander populations, and particularly amongst children within these communities.

Unlike many other diseases or public health issues, sepsis does not have a natural advocate within the healthcare system. A patient presenting to hospital with sepsis will be treated by a physician with expertise in other areas, as knowledge of sepsis treatment and rehabilitation is dispersed throughout a hospital. This results in a lack of coordinated or integrated care for the patient as they transition from the emergency department or ICU to a hospital ward, or from the hospital to home, often resulting in poorer outcomes.

Media coverage in Australia also highlights the common problem of lack of awareness of sepsis. Most stories are about deaths that result from lack of individual awareness of the symptoms of sepsis, late presentation to hospital, and delayed treatment. In many cases, media reports amplify the issue by failing to mention sepsis as the cause of death or disability, or by using the outdated terms, “septicaemia” or “blood poisoning”.



In 2016, a national awareness survey found 60% of Australians have not heard of sepsis, and only 14% could name one of its symptoms. Sepsis, as a result of a life-threatening infection, is a time-critical condition requiring rapid recognition and treatment with

antibiotics. Early treatment is known and proven to save lives. With approximately 70% of cases originating outside of hospital, low public awareness of sepsis in Australia leads to delayed recognition and treatment, and a higher likelihood of death or disability for patients.

In recent years, the impact of sepsis on the daily lives of families, adults and children who survive it has become all too clear. In addition to physical effects (including at the extreme, limb amputations), cognitive impairment, psychological symptoms and post-traumatic stress disorder (PTSD) are reported by up to two-thirds of sepsis survivors. Currently there is no integrated approach to follow-up and care for survivors and their families, which is compounded by a limited understanding across the Australian primary, secondary and tertiary healthcare sectors of post-sepsis outcomes and burdens.

The economic burden of sepsis on individuals and at an Australian societal level is substantial. The true cost of sepsis to the Australian healthcare system and community is unknown. In the United States sepsis is the most expensive condition treated in hospitals and is estimated to cost USD\$27 billion each year. Preliminary research in Australia puts the cost of treating sepsis in ICUs at AU\$846 million annually. This does not account for the costs of treating sepsis outside ICUs, or the ongoing treatment of survivors and costs related to loss of earnings and productivity. The total financial burden is estimated to exceed AU\$1.5 billion.

Key recommendations



Summary of key recommendations from the roundtable

1. *Establish a nationally-coordinated sepsis body to facilitate the action plan.*
2. *Invest in prevention and awareness campaigns to spur action within the community.*
3. *Establish and implement a nationally recognised clinical standard for sepsis detection and treatment.*
4. *Invest in community and peer support services for sepsis survivors and their families.*



Key recommendations from the roundtable

These recommendations were developed in the roundtable based on a framework of collaborative, solution-focussed discussion and formal consensus. Various topics pertinent to the creation of a national sepsis action plan were addressed in small-group discussions and brought to a consensus by stakeholders present on the day. Stakeholders included clinical, academic and policy professionals from Australia and around the world, as well as sepsis survivors and their advocates.

During the roundtable, three facilitator-led working groups identified opportunities, barriers, and solutions to inform action on one or more of the following themes:

- **Prevention and awareness;**
- **Early detection and treatment; and**
- **Support for survivors of sepsis.**

The broader roundtable group re-convened to discuss and refine working group recommendations at length. Four formal recommendations were developed by group consensus with sub-recommendations to describe how formal recommendations will be achieved. These recommendations range from short term actions, which can have immediate effect, to longer term whole of health system change. They include emphasis on a nationally coordinated strategy as the most effective anchor for change, and should be considered as such throughout.



Recommendation 1: Establish a nationally-coordinated sepsis body to facilitate the action plan

A coordinated effort is needed to drive sepsis research, care and awareness in Australia. It is recommended that a peak body be established to manage the national sepsis agenda.

The national sepsis body should liaise with multiple jurisdictions. This would include the Australian Health Ministers' Advisory Council (AHMAC), the support body to the Council of Australian Governments, responsible for strategy on the national coordination of health services. The national sepsis body should also liaise with federal research funding agencies, local state-based health service and governments, universities, medical specialist colleges and societies, and survivor support networks. It was agreed that existing sepsis research or advocacy collaborations may be leveraged and developed into a national advisory and coordination body.

The national sepsis body should be responsible for coordination of appropriately targeted Australia-wide awareness and prevention campaigns targeting all age groups, and be directly involved in the development and implementation of the clinical care standards and pathways detailed in the third recommendation of this report.

Recommendation 1a: Develop and disseminate educational materials

The national sepsis body will act as a central point of information, with resources tailored for the general public, clinicians, general practitioners (GPs) and other healthcare workers, for patients and their families, and for professional, research, accreditation or policy organisations. This will include producing materials that can affirm appropriate definitions and terminology as it relates to sepsis. An increase in public knowledge of the consistent, correct and appropriate use of the term 'sepsis' when talking about sepsis is key to empowering patients, parents and families, and enabling them to address and escalate health concerns with their primary care physicians, in hospital emergency departments, or in hospital wards. Awareness of the

clinical terminology will then be reflected in more accurate mainstream media coverage of deaths and disabilities resulting from sepsis.

As a central and coordinating arm, the national body will produce and disseminate awareness and educational materials, such as pamphlets for healthcare workers, patients and families, or community-specific materials.

Recommendation 1b: Define data and definitions



The national sepsis body will, with appropriate and thorough consultation with stakeholders, develop and define reliable documentation and coding standards to be used clinically and in research. A lack of appropriate clinical coding of sepsis is a key issue and should be made a priority area for research and quality improvement to ensure national consistency in measuring sepsis incidence, prevalence and burden in hospital administrative databases. As sepsis may be expressed in various ways clinically (for instance, 'pneumonia with renal failure'), many hospital-treated cases and deaths resulting from sepsis are instead attributed to underlying health conditions or diseases. Improved coding will greatly improve measurement of hospital-treated sepsis across emergency departments and in hospital wards. Specific and well-defined coding will capture the real incidence and resultant mortality from sepsis across all age groups in Australia.

Recommendation 1c: Build research capacity

A national body would be charged with coordinating large-scale collaborative research efforts between universities, hospitals and health services, industry partners, and consumers. This body will secure and drive research and health sector investment in sepsis interventions, and develop a clinical-standard national



Case studies of success:

RORY'S REGULATIONS – New York State, United States of America

In March 2012, twelve-year-old Rory Staunton developed sepsis following a minor basketball injury. It was not recognised and he died less than a week later. Rory's parents established a foundation in their son's name and began to campaign for improved awareness of sepsis, especially in children.

As a result of the Stauntons' tireless lobbying, New York State Governor Andrew Cuomo signed 'Rory's Regulations' in January 2013. The regulations make sepsis guidelines mandatory and require all New York State hospitals to adopt processes for early detection and treatment of sepsis, as well as special procedures for paediatric patients at risk of sepsis.

'Rory's Regulations' has been credited with saving almost 5,000 lives in New York State.

database to appropriately define and measure the incidence of sepsis in Australia.

Research efforts in sepsis have historically focussed on downstream issues that occur after admission to intensive care, however, there is scope and need to extend the research lens to a whole of healthcare system approach. This would include incorporating community, primary, secondary and tertiary care into large-scale, cross-sector and collaborative research efforts.

The national sepsis body would oversee the national implementation and use of electronic or computerised screening and alert systems in both primary care and hospital settings. Improved alert systems will more quickly identify patients who are high-risk or who have developed sepsis, so that appropriate treatment is commenced as early as possible.

Recommendation 2: Invest in prevention and awareness campaigns to spur action within the community

Increased awareness and early recognition of sepsis has reduced death and disability in some parts of Australia and in other high-income countries. A

cohesive and structured national approach to public and healthcare worker awareness of sepsis is vital to reduce death and disability. It will also assist sepsis survivors and their carers in managing recovery.

Recommendation 2a: Increase public awareness and education

Public awareness campaigns focussed on early recognition of sepsis are key to reducing incidence and mortality, as they increase earlier detection and treatment. Previous or current successful Australian awareness campaigns, like HIV, meningococcal, influenza prevention, and stroke are templates for public sepsis education. Further, the option to combine sepsis education with existing and relevant awareness campaigns should be explored.



Awareness programs and materials should be developed by the national sepsis body and tailored for the general population as well as vulnerable or high-risk groups (detailed in recommendation 1). Lack of awareness of sepsis among parents leaves children, a particularly vulnerable group, open to greater risk of delayed treatment. More than 50% of paediatric deaths due to sepsis occur within 24 hours, so education of parents should focus on early recognition of symptoms, the specific patterns and needs of infants and children with sepsis, and empowering parents to seek urgent medical care.



Recommendation 2b: A national approach to World Sepsis Day

We recommend a national approach to promotion of World Sepsis Day (WSD). WSD is an initiative of the Global Sepsis Alliance (GSA), held annually on 13 September. As with sepsis awareness in general, local WSD campaigns rely heavily on promotional and educational materials developed by the GSA or by organisations from other countries. An organised, Australia-focused WSD campaign, modelled on successful local examples of health promotion, would have greater impact and visibility.

A cohesive and 'branded' approach to WSD would fall under the jurisdiction of the national sepsis body. The national sepsis body should coordinate WSD promotion by acting as a contact point for community members, healthcare services, research institutions, universities and other organisations wishing to undertake WSD promotion initiatives. WSD promotion events may include medical education, providing information to general public, sports activities and fundraising. The national peak body would facilitate the distribution of standardised educational materials including infographics and pocket cards for health professionals as well as the public.

Recommendation 3: Establish and implement a nationally recognised clinical standard for sepsis detection and treatment.



As sepsis detection and treatment straddles multiple health and medical disciplines, a national clinical standard for sepsis should be developed and implemented across the whole healthcare system. A clinical standard is a set of quality statements and principles, based on current best evidence, that define the care patients should be offered by health professionals. For sepsis, a clinical standard should be developed in consultation with primary care physicians, emergency physicians, infectious disease specialists, intensive care clinicians, nursing representatives, allied health professionals, and sepsis survivors and, for paediatric sepsis, also parents or families.

As health processes are implemented differently on a state-by-state basis, a clinical standard may best operate as a set of national principles that may be applied at state or local health district levels, and in primary care and rehabilitation. Different sectors of the health system will require tailored approaches according to their specific needs.

Recommendation 3a: Improve in-hospital sepsis care

Clinical care pathways for rapid in-hospital detection, treatment and management of sepsis should be





developed and implemented at a national level with regional modification as required. Pathways should be tailored to suit the needs of emergency departments (ED), ICUs and hospital wards. Interventions for recognition and management should specifically target paediatric sepsis. As sepsis can present insidiously and over time, longitudinal safety nets are required so that in-hospital care for sepsis is consistent and coordinated, and communication between clinical teams is improved.

It is recommended that 'sepsis teams' be developed, like existing Rapid Response Teams (RRT), incorporating intensive care physicians, antimicrobial stewardship and nursing expertise. Sepsis teams should have a designated 'Sepsis Care Coordinator', ideally a specialist nurse, who will coordinate patient care between ICUs and hospital wards. Sepsis Care Coordinators will be a dedicated resource with specialised knowledge, who will liaise with clinicians, ward staff, and allied health professionals. The Coordinators will improve awareness and recognition of in-hospital sepsis through targeted education programs and follow-up of patients identified as being at-risk for the development of sepsis.

Currently, most hospital-based medical and nursing staff receive mandatory training in recognition of deteriorating patients. A sepsis-focussed module should be embedded into existing training programs. Physiological indicators of sepsis should be incorporated into existing observation charts within hospital departments, to embed sepsis recognition into routine care.

Clinical care standards for sepsis should harness evolving technologies, such as electronic health and medical records, to ensure ever-changing health care and hospital systems can optimise recognition and management of sepsis and are capable of delivering the needs of national sepsis data collection.

For sepsis survivors, the Sepsis Care Coordinator will initiate a report or letter for the patient's primary care physician, and provide the patient with support information upon discharge from hospital. Sepsis teams should incorporate dedicated clinicians in hospital

wards – or 'sepsis champions' – so that where possible, a patient with sepsis who is moving from the ED or ICU to a hospital ward, can be discharged to staff with relevant expertise.

Recommendation 3b: Ensure appropriate care for sepsis survivors: in-hospital and post-hospital

There is currently no integrated approach to the longer-term care for those who survive sepsis. Physical disability as a result of sepsis is common amongst survivors. One-third of paediatric or neonatal sepsis survivors will suffer from moderate to severe disability, often with lifelong effects. The national clinical standards should include guidelines for hospital discharge, follow-up and continued rehabilitation and primary care with post-sepsis care commencing before patients are discharged from hospital.



Many adult sepsis survivors report an increase in anxiety or symptoms of PTSD following hospitalisation. On discharge from hospital, patients who have experienced sepsis may benefit from psychological evaluation and assessment of physical function, with a recommendation to their primary care physician for specific follow-up as required. Coordination of follow-up care, including education to assist sepsis survivors to



recognise a need to seek further assistance and support, should be initiated by the Sepsis Care Coordinator prior to hospital discharge. For children who survive sepsis, they and their parents and families have unique needs and require a coordinated care appropriate to their age group.

Monitoring mental health for patients recovering from sepsis should be a priority of continued primary care. Communication and reports to general practitioners, allied health or rehabilitation staff should include the term sepsis in diagnostic information, and use correct and consistent terminology.

Standards for patient discharge from hospital should include referrals to local or national support groups that may be accessed by survivors, their carers, or families of patients who die from sepsis. Parents of children who die from sepsis need appropriate and specialised referral and support.

Recommendation 3c: Facilitate targeted training for healthcare workers

A national standard of training and education on sepsis is required for the hospital workforce, to reduce the disparity of sepsis expertise between ED, ICU and ward staff. Standard sepsis training for critical care and ward nurses will improve identification of at-risk patients, and disseminate existing knowledge more widely within the hospital. This training would be conducted by sepsis teams.

Sepsis training for the health workforce should be based around the national clinical guidelines. This would include hospitals being required to produce sepsis data to a standardised level and should eventually be linked to hospital accreditation.

Extending standard sepsis training beyond hospitals, to the allied health and primary care workforce, will also improve early detection and ensure appropriate and consistent terminology is used along the care pathway. Following discharge from hospital, as patients transition to rehabilitation and recovery programs, sepsis should be included with diagnostic and referral information given to primary care physicians, physical or occupational therapists and other professionals involved in sepsis recovery.

Recommendation 4: Invest in community and peer support services for sepsis survivors and their families

There are currently no formal support mechanisms in Australia for sepsis survivors or their families and carers. The limited support systems available include survivor-initiated online support groups, or disability support groups which are not specific to sepsis survivors.

People recovering from sepsis, and the families of patients who did not survive, remain the biggest and most important advocates for public awareness of sepsis, and it is essential they are directly involved and consulted in the design of community and peer support groups and services.

Case studies of success: NATIONAL SEPSIS CAMPAIGN – United Kingdom

Following a 2013 report by the Health Service Ombudsman which highlighted the unnecessary deaths of ten patients from sepsis, the National Health Service, working with the UK Sepsis Trust and key figures in the health system or services, developed an action plan to tackle sepsis nationally. The comprehensive plan detailing measures to improve early detection of sepsis. It has raised awareness amongst the public and healthcare professionals, improved the treatment of sepsis, and has resulted in more accurate reporting standards.

The coordinated effort includes a national prevention and awareness campaign that has received formal support from the Secretary of State for Health, The Rt Hon Jeremy Hunt MP, with freely available educational tools, and a particular focus on paediatric sepsis.

The UK Sepsis Trust has estimated that 14,000 deaths could be prevented annually with improved public awareness and healthcare pathways for patients with sepsis.



Case studies of success: SEPSIS KILLS – New South Wales, Australia

SEPSIS KILLS is an adult patient safety program implemented in New South Wales by the Clinical Excellence Commission. The program aims to reduce preventable harm from sepsis for patients in a hospital setting by improving recognition and management of sepsis. The program is a quality improvement initiative based on international evidence-based practice and has been implemented across NSW public hospital emergency departments. Its focus is to:

- Recognise risk factors, signs and symptoms of sepsis;
- Resuscitate with antibiotics and intravenous fluids within 1 hour; and
- Refer to senior clinicians and specialist care.

The SEPSIS KILLS program supports clinicians to recognise and respond appropriately to adult, paediatric, maternal and newborn sepsis. Since its launch in 2011, the SEPSIS KILLS program has successfully reduced the mortality rate of sepsis, and improved patient outcomes across NSW public health facilities through strategic leadership and clinician collaboration

Recommendation 4a: Build capacity for the appropriate support for survivors

We recommend the national sepsis body endorse and formalise an Australian sepsis support group and act as a central point of contact, allowing for an easily-referenced source of information for patients leaving hospital, or families who have experienced a death due to sepsis. Linking an Australia-wide support group to the national sepsis body will allow healthcare workers or GPs to connect patients to appropriate support quickly.

Additionally, a centralised referral point for a national support group will enable individuals in remote or regional areas of Australia to more easily access advice and support online. In addition, these resources could be used as sepsis survivors return to work and manage their health requirements against the expectations of employers.



Summary



The WHO resolution, co-sponsored by Australia, provides a timely reminder of the unrecognised burden of sepsis. This is an opportunity to develop a coordinated and cohesive national action plan to reduce sepsis-related deaths and disability in Australia. Sepsis causes significant personal, societal and financial burden. It causes or contributes to the deaths of almost 5000 Australians every year, with many survivors unable to return to their previous lives due to the physical, cognitive and psychological disabilities that follow sepsis. The financial cost is substantial. The cost of hospital treatment is estimated at more than AU\$800 million for patients with sepsis treated in an ICU, with the total financial burden to the healthcare system likely to exceed approximately AU\$1.5 billion each year.

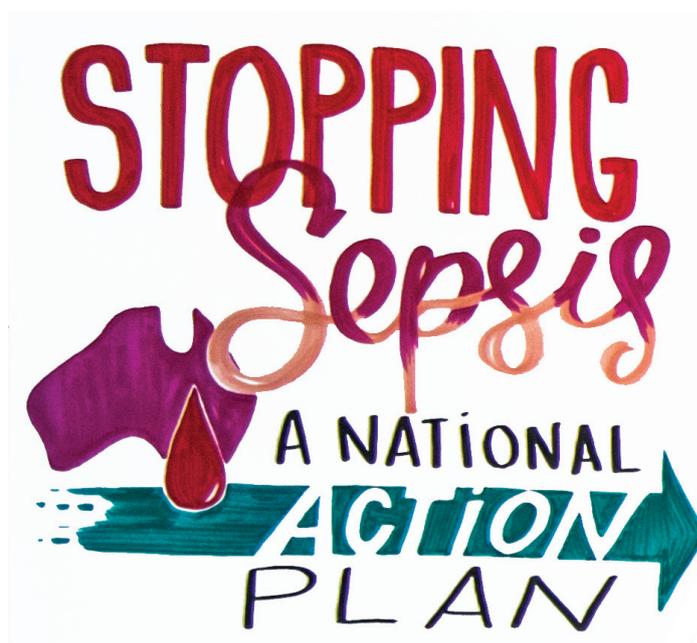
To date, prevention and care of sepsis in Australia has been fragmented, with a lack of national coordination and limited public awareness. The policy roundtable on 16 November 2017 aimed to explore these challenges and to identify existing and new solutions. These recommendations for a national action plan on sepsis in Australia were collectively agreed by key stakeholders present at the roundtable.

A coordinated effort managed by a designated peak sepsis body is required to drive improvements and reduce the burden of sepsis in Australia. The national sepsis body should liaise with multiple jurisdictions and organisations and be responsible for coordinating appropriately targeted national awareness and prevention campaigns. It should be directly involved in the development of clinical care standards and pathways to improve the recognition and management of sepsis across the whole health system.

As sepsis detection and treatment crosses multiple health and medical disciplines, increasing both public and healthcare worker awareness of the signs and symptoms of sepsis is key to reducing the burden of illness. The approach should be national, cohesive and structured, and targeted at the community and healthcare providers. Implementation of a national clinical standard for sepsis, should address both adult and paediatric sepsis and be adopted using a whole

of healthcare system approach. The clinical standard should not only focus on rapid recognition and appropriate treatment, but should recognise the need for continued support for survivors and their families, both within and after discharge from hospital.

The task of improving sepsis detection and management across the spectrum of care presents some unique challenges. A coordinated, cohesive, national approach on top of current state and territory based initiatives will reduce both preventable deaths and disability. Engagement across all levels of society will be essential to making progress. This report and the recommendations are the first steps towards creating an Australian national action plan that can save lives from sepsis. They represent the collective views of key stakeholders already working to reduce death and disability due to sepsis, and are consistent with the WHO Sepsis resolution co-sponsored by Australia.



Host Organisations



About The George Institute for Global Health

The George Institute for Global Health is an independent global medical research institute, established and headquartered in Sydney, with major centres in China, India and the UK. The George is focussed on reducing the burden of the leading causes of death and disability around the world – chronic disease and injury. Our research has driven major improvements in the prevention and treatment of heart disease, stroke, diabetes, kidney disease, and many other conditions, and our researchers have been recognised among the world's best for scientific impact and excellence. Affiliated with world class universities such as UNSW Sydney, we have over 600 staff globally, a global network of collaborators, projects in more than 50 countries, and raised over \$730 million for global health research. In 2017, we celebrate 10 years of impact in China and India. To have the greatest impact on health outcomes, The George also convenes health policy forums in Australia, China, India and the UK to contribute to healthcare debate and evidence-based policy reform. The George Institute for Global Health has established a commercial subsidiary, George Health Enterprises to expedite the translation of some of its research findings into practice, while generating profits to support the Institute.

www.georgeinstitute.org

About the Australian Sepsis Network

The Australian Sepsis Network is a network of individuals and organisations who are working to improve outcomes for Australian patients with sepsis, and to provide information or support to the families and friends of people with sepsis, or individuals who would like to become involved in sepsis advocacy or research. The Network is not designed to duplicate the efforts of its member organisations but to provide an avenue through which members can collaborate to better disseminate information about sepsis to healthcare workers and the general community. Sepsis is a condition that is responsible for or contributes to up to half of all deaths occurring in hospital. Sepsis causes almost 5000 deaths in Australia each year yet few people have heard of it. Sepsis already causes a significant but unappreciated burden of disease but as the population ages, this burden will increase substantially. Unlike conditions such as heart disease or breast or prostate cancer, sepsis affects people of all ages and patients cared for by almost all hospital doctors. As a result, there has until now, been no group specifically dedicated to reducing the burden of sepsis. The Network is hosted by The George Institute for Global Health, which provides the necessary infrastructure as in-kind support for the operation of the Network.

www.australiansepsisnetwork.net.au

Project team

The roundtable and report was a joint production of The George Institute for Global Health and the Australian Sepsis Network.

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Sources



Balamuth F, Alpern ER, Abbadessa MK, et al. Improving recognition of pediatric severe sepsis in the Emergency Department: contributions of a vital signs-based electronic alert and bedside clinician identification. *Ann Emerg Med* 2017; 70(6):759–68. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28583403>

Davis JS, Cheng AC, McMillan M, Humphrey AB, Stephens DP, Anstey NM. Sepsis in the tropical Top End of Australia's Northern Territory: disease burden and impact on Indigenous Australians. *Med J Aust* 2011; 194(10):519–24.

Dwyer J. A boy's life is lost to sepsis. Thousands are saved in his wake. *The New York Times*, 13 April 2017. Accessed 26 November 2017 at <https://www.nytimes.com/2017/04/13/nyregion/a-boys-life-lost-to-sepsis-but-thousands-saved-in-his-wake.html>

Gander K. Sepsis: Campaign to raise awareness of UK's second biggest killer could save 14,000 lives, says charity. *The Independent*, 22 February 2016. Accessed 26 November 2017 at <http://www.independent.co.uk/life-style/health-and-families/health-news/sepsissepsiscampaign-to-raise-awareness-of-uks-second-biggest-killer-would-save-14000-lives-says-a6888761.html>

Glaspey LJ, Roberts MB, Mazzarelli A, Trzeciak S, Roberts BW. Early interventions for the prevention of post-traumatic stress symptoms in survivors of critical illness: protocol for a systematic review. *BMJ Open* 2017;7(9). Available from: <http://bmjopen.bmj.com/content/7/9/e018270>

Hartman ME, Linde-Zwirble WT, Andus DC, Watson RS. Trends in the epidemiology of pediatric severe sepsis. *Pediatr Crit Care Med* 2013; 14(7): 686–93. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/23897242>

Improving outcomes for patients with sepsis. National Health Service England, December 2015. Available from: <https://www.england.nhs.uk/wp-content/uploads/2015/08/Sepsis-Action-Plan-23.12.15-v1.pdf>

Influenza – Immunise Australia Program. Australian Department of Health. Accessed 25 November 2017 at <http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/immunise-influenza>

Jones C, Griffiths RD. Mental and physical disability after sepsis. *Minerva Anesthesiol* 2013;79(11):1306–12. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/23857443>

Kaukonen KM, Bailey M, Suzuki S, Pilcher D, Bellomo R. Mortality related to severe sepsis and septic shock among critically ill patients in Australia and New Zealand, 2000–2012. *JAMA* 2014;311(13):1308–16. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/24638143>

Meningococcal Australia. Accessed 27 November 2017 at <http://www.meningococcal.org.au/>

Nguyen SQ, Mwakalindile E, Booth JS, et al. Automated electronic medical record sepsis detection in the emergency department. *PeerJ* 2014; 2:e343. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3994640/>

Our Campaigns – Stroke Foundation. Accessed 25 November 2017 at <https://strokefoundation.org.au/What-we-do/Policyandadvocacy/OurCampaigns>

Ostrowski JA, MacLaren G, Alexander J, et al. The burden of invasive infections in critically ill Indigenous children in Australia. *Med J Aust* 2017; 206(2):78–84.

Road Deaths Australia – Monthly Bulletins. Australian Department of Infrastructure and Regional Development, October 2017. Accessed 26 November 2017 at https://bitre.gov.au/publications/ongoing/road_deaths_australia_monthly_bulletins.aspx

Reinhart K, Daniels R, Kissoon N, et al. Recognising sepsis as a global health priority – a WHO Resolution. *New England Journal of Medicine* 2017; 377:414–417. Available from: <http://www.nejm.org/doi/full/10.1056/NEJMp1707170#t=article>



Ruth A, McCracken CE, Fortenberry JD, Hall M, Simon HK, Hebbar KB. Pediatric severe sepsis: current trends and outcomes from the Pediatric Health Information Systems database. *Pediatr Crit Care Med* 2014; 15(9):828-38. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/25226500>

Schlapbach LJ, Straney L, Alexander J, MacLaren G, Festa M, Schibler A, Slater A, ANZICS Paediatric Study Group. Mortality related to invasive infections, sepsis, and septic shock in critically ill children in Australia and New Zealand, 2002-13: a multicentre retrospective cohort study. *Lancet Infect Dis* 2015;15(1):46-54. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/25471555>

Schmidt K, Thiel P, Mueller F, et al. Sepsis survivors monitoring and coordination in outpatient health care (SMOOTH): study protocol for a randomized controlled trial. *Trials* 2014;15(283). Available from: <https://trialsjournal.biomedcentral.com/articles/10.1186/1745-6215-15-283>

Sepsis Kills – Adult Patient Safety. Clinical Excellence Commission. Accessed 25 November 2017 at <http://www.cec.health.nsw.gov.au/patient-safety-programs/paediatric-patient-safety/pqp-sepsis-kills>

Sepsis Kills – Paediatric Patient Safety. Clinical Excellence Commission. Accessed 25 November 2017 at <http://www.cec.health.nsw.gov.au/patient-safety-programs/adult-patient-safety/sepsis-kills>

Sepsis: recognition, diagnosis and early management. NICE guidelines [NG51]. National Institute for Health and Care Excellence, September 2017. Available from: <https://www.nice.org.uk/guidance/ng51>

Sepsis Regulations: Guidance Document 405.4 (a) (4). New York State Department of Health, July 2013. Available from: https://www.health.ny.gov/regulations/public_health_law/section/405/

Sepsis Study (survey). The George Institute for Global Health, August 2016.

World Health Organization. The ICD-10: international statistical classification of diseases and related health problems. 10th revision, 2nd edition. Geneva: World Health Organization, 2004.

Zuick S, Asch DA, Graustein A, Urbani R, Carrol B, Mikkelsen ME, Fuchs BD. *J Intensive Crit Care* 2016; 2:3. Available from: <http://criticalcare.imedpub.com/can-a-computerized-sepsis-screening-and-alert-system-accurately-diagnose-sepsis-in-hospitalized-floor-patients-and-potentially-pro.php?aid=11279>

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