Sepsis Trust NZ

Health Quality & Safety Commission
Te Tāhū Hauora

Clinical Guide to Sepsis Management in New Zealand

He Aratohu Haumanu hei Whakahaere Mate Whakataoke

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Te Kāwanatanga
o Aotearoa
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Contents | Ngā ihirangi

Acknowledgements | He whakamihi

Clinical editors of BPAC and NICE NG51 guidelines

This guide was adapted from the “Sepsis: recognition, diagnosis and early management” guideline published by Best Practice Advisory Centre New Zealand (bpac^{nz}) in 2018. The bpac^{nz} guideline itself was an adaptation of Suspected sepsis: recognition, diagnosis and early management (NG51) © National Institute for Health and Care Excellence (2016). That adaptation was undertaken in agreement with the UK’s National Institute for Health and Care Excellence (NICE) to contextualise the NG51 guideline for the New Zealand health care sector. Health Quality & Safety Commission Te Tāhū Hauora (the Commission) has also obtained permission from NICE to use content from the bpac^{nz} guideline to support the content of this guide.

Sepsis Technical Advisory Group

Members of the Commission’s Sepsis Technical Advisory Group (STAG) have been major contributors to the development of this Guide. This group was established in September 2024 and includes representatives from the following professional groups:

- Ambulance Services (Hato Hone St John and Wellington Free Ambulance)
- Australasian Society for Infectious Diseases
- Australian and New Zealand College of Anaesthetists
- Australian and New Zealand Intensive Care Society
- Australian College for Emergency Medicine
- Health New Zealand Te Whatu Ora
- New Zealand Antimicrobial Stewardship & Infection Pharmacist Expert Group
- New Zealand College of Critical Care Nurses
- New Zealand College of Medicine
- New Zealand College of Midwives
- New Zealand Microbiology Network
- New Zealand Nurses Organisation
- Paediatric Society of New Zealand
- Royal Australasian College of Surgeons
- Royal Australian and New Zealand College of Obstetricians and Gynaecologists
- Royal New Zealand College of General Practitioners
- Royal New Zealand College of Urgent Care
- Sepsis Trust New Zealand.

Commitment to Te Tiriti o Waitangi and health equity | Ū ki Te Tiriti me te hauora tautika

The sepsis project team is committed to developing and implementing the sepsis project in a manner that enables equitable outcomes for Māori. The team incorporated Te Tiriti o Waitangi principles throughout the project.

The team applied an equity lens to various areas of the project by:

- having a Māori advisor in the project team, who consulted with other Māori elders when necessary
- using an ethnicity or demographic lens for data collection and review
- incorporating the lived experience of sepsis consumers and their whānau
- advising hospital project teams to collaborate with Māori and Pacific representatives, ensuring Te Tiriti principles are embedded and encouraging their involvement in relevant aspects of implementation.

Background and context | Kōrero o mua

This document sets out standards of care for people with sepsis presenting to health care settings in Aotearoa New Zealand. It is endorsed by Sepsis Trust New Zealand, Health Quality & Safety Commission Te Tāhū Hauora (the Commission) and the Commission's Sepsis Technical Advisory Group. It has been developed during a multi-year revision of the 'Raise the Flag' sepsis quality improvement programme first launched at Waikato Hospital in 2018.

The 'Raise the Flag' programme was developed using national guidance published by BPAC^{NZ}: (*Sepsis: Recognition, diagnosis and early management*) in 2018[1]. This was based on a 2016 publication from the United Kingdom's National Institute for Health and Care Excellence (NICE).[2]

In January 2024, NICE published new recommendations, which BPAC^{NZ} has not yet reviewed or supported. The 'Raise the Flag' programme therefore continues to make use of the 2018 document. Both NICE and BPAC^{NZ} provided permission for the Commission to revise the 2018 guideline recommendation to support sepsis quality improvement in New Zealand.

The following clinical guidance supporting 'Raise the Flag' clinical pathways is based on the 2018 BPAC^{NZ} guideline but represents the views of the Commission and its Sepsis Technical Advisory Group.

[1] BPAC guideline. Sepsis. Recognition, diagnosis and early management. June 2028

[2] NICE guideline. Suspected sepsis: recognition, diagnosis and early management. NG51. Published 13 July 2016. Updated 19 March 2024.

Overview

This guide covers the recognition, diagnosis and early management of sepsis in New Zealand.

It is for health care professionals working in primary, secondary and tertiary care. People who have experienced sepsis and their family/whānau can use it as a care standard.

We will review and update this guide regularly to ensure it reflects the latest evidence and best practices, thus maintaining its relevance and effectiveness in guiding sepsis care.

Purpose of this guideline

This guide:

- is to help professionals and patients make decisions about the most appropriate treatment and care for specific clinical circumstances
- can be used to develop standards to assess the clinical practice of individual health professionals and organisations
- can support the education and training of health professionals and others
- can improve communication between patients and health professionals, and
- * the asterix refers to the use of sepsis definitions in this document.

Sepsis definitions*

Significant confusion and harm can arise from the use of historic, inaccurate or incorrect definitions of sepsis. The following definitions of sepsis are accepted; they are the only ones that will be used in the Raise the Flag programme and by the Commission:

Sepsis is a life-threatening organ dysfunction due to a dysregulated host response to infection.

Septic shock is a subset of sepsis in which particularly profound circulatory, cellular and metabolic abnormalities substantially increase mortality.

Explanation of sepsis in lay terms

Sepsis is a life-threatening condition that arises when the body's response to an infection injures its own tissues and organs.

Narrative elaboration for use in public facing material

The following statements also apply to sepsis in the context of this document.

- Sepsis arises when the body's response to an infection injures its own tissues and organs.
- Sepsis can lead to shock, multi-organ failure and death – especially if it is not recognised early and treated promptly.
- Sepsis is the final common pathway to death from most infectious diseases worldwide.

Recommendations | Ngā tūtohinga

People with symptoms and signs of sepsis have the right to service of an appropriate standard under the Code of Health and Disability Services Consumer Rights. For the exclusion of doubt, this guide describes 'service of an appropriate standard'.

1. Identifying people with suspected sepsis

This guidance should be used together with 'Raise the Flag' clinical pathways organised by age group and treatment location. The pathways are designed for staff working in hospitals, general practices or adequately equipped urgent care providers.

There are three such pathways for the following groups:

- Paediatric: children (aged 11 and under)
- Adult and Young Person: adults and young people (aged 12 and over)
- Maternal: people who are pregnant or less than 6 weeks postpartum.

1.1 Specific guidance for providers working in primary and urgent care can be found in HealthPathways (www.communityhealthpathways.org).

1.2 Providers working in ambulance services and primary or urgent care should refer to context-specific guidelines where available.

1.3 In all settings, think 'could this be sepsis?' if a person who looks unwell with signs or symptoms of infection.

1.4 Take into account that people with sepsis may have non-specific, non-localised presentations and may not have a high temperature.

1.5 Pay particular attention to concerns expressed by the person and their family/whānau and carers, for example, changes from usual behaviour.

1.6 Assess people who might have sepsis with extra care if the clinical history is not easily forthcoming (for example, people with English as a second language or people with communication problems).

1.7 * Assess people with any suspected infection to identify:

- a possible source of infection
- factors that increase risk of sepsis (see recommendation 2).

1.8 Take into account factors that increase the risk of sepsis or indications of clinical concern (such as new-onset abnormalities of behaviour, circulation or respiration) when deciding during a remote assessment whether to offer a face-to-face-assessment and, if so, the urgency of that assessment.

1.9 Use a structured set of observations to assess people in a face-to-face setting to stratify risk (see recommendation 3) if you suspect sepsis.

1.10 Use an early warning score (EWS), paediatric EWS (PEWS) or maternal EWS (MEWS)) to assess and monitor people with suspected sepsis in acute hospital settings.

1.11 Suspect neutropenic sepsis in patients having anticancer treatment who become unwell.

1.12 Refer patients with suspected neutropenic sepsis immediately for assessment in secondary or tertiary care.

2. Risk factors for sepsis

2.1 * Take into account the following groups are at higher risk of developing sepsis:

- Māori and Pacific peoples
- very young people (under 1 year), older people (over 60 years or over 50 years if of Māori or Pacific ethnicity), very frail people and people who live with significant medical co-morbidity
- people who have impaired immune systems because of illness or drugs, including people being treated for cancer with chemotherapy
- people who have impaired immune function (eg, people with diabetes, people who have had a splenectomy or people with sickle cell disease)
- people taking long-term steroids
- people taking immunomodulatory therapy to treat non-malignant disorders such as rheumatoid arthritis
- people who have been subject to major trauma, surgery or other invasive procedures in the past six weeks
- people who have been subject to health care exposure (including hospital admission, antimicrobial drugs, chemotherapy, wound care or dialysis) in the past six weeks
- people with any breach of skin integrity (e.g., cuts, burns, blisters or skin infections)
- people who misuse drugs intravenously
- people with indwelling lines or vascular access catheters.

2.2 Take into account that people who are pregnant, have given birth or have had a termination of pregnancy or miscarriage in the past six weeks are at high risk of sepsis. In particular, this includes people within that group who:

- have impaired immune systems because of illness or drugs (see recommendation 1.1.5)
- have gestational diabetes or diabetes or other comorbidities
- needed invasive procedures during labour (e.g., caesarean recommendation, forceps delivery, removal of retained products of conception)
- had prolonged rupture of membranes
- have or have been in close contact with people with group A streptococcal infection (eg scarlet fever)
- have continued vaginal bleeding or an offensive vaginal discharge.

2.3 * Take into account the following risk factors for early-onset neonatal infection:

- invasive group B streptococcal infection in a previous baby
- maternal group B streptococcal colonisation, bacteriuria or infection in the current pregnancy
- pre-labour rupture of membranes
- preterm birth following spontaneous labour (before 37 weeks' gestation)
- suspected or confirmed rupture of membranes for more than 18 hours in a preterm birth
- intrapartum fever higher than 38°C, or confirmed or suspected chorioamnionitis
- parenteral antibiotic treatment given to the woman for confirmed or suspected invasive bacterial infection at any time during labour, or in the 24-hour periods before and after the birth (this does not refer to intrapartum antibiotic prophylaxis)
- suspected or confirmed infection in another baby, in the case of a multiple pregnancy.

3. Face-to-face assessment of people with suspected sepsis

3.1 *Assess temperature, heart rate, respiratory rate and level of consciousness in all people with suspected sepsis. Consider capillary refill time and the appropriate measurement of blood pressure in children. Measure oxygen saturation if equipment is available and taking a measurement does not cause a delay in assessment or treatment (see recommendation 3.6 below).

3.2 * Check capillary refill time in children aged 11 years and under with suspected sepsis.

3.3 * Measure the blood pressure of children under five years if heart rate or capillary refill time is abnormal and facilities to measure blood pressure, including a correctly sized blood pressure cuff, are available.

3.4 Measure the blood pressure of children aged 5–11 years who might have sepsis if facilities to measure blood pressure, including a correctly sized cuff, are available.

3.5 In community settings, only measure blood pressure in children aged 11 years and under if facilities to measure blood pressure, including a correctly sized cuff, are available and taking a measurement does not cause a delay in assessment or treatment.

3.6 Measure oxygen saturation in community settings if equipment is available and taking a measurement does not cause a delay in assessment or treatment. Note that pulse oximeters may report falsely elevated oxygen saturations in people with darker skin.

3.7 Examine people with suspected sepsis for mottled or ashen appearance; cyanosis of the skin, lips or tongue; non-blanching rash of the skin; any breach of skin integrity (eg cuts, burns or skin infections); or any other rash indicating potential infection.

4. Stratifying risk of severe illness or death from sepsis

4.1 Use the person's history and physical examination results to grade risk of severe illness or death from sepsis using criteria based on age (see Tables 1, 2 and 3). Findings predicting a high risk of severe illness or death are described as RED FLAGS in clinical pathways.

4.2 Findings predicting a moderate- to high risk are described as AMBER FLAGS. Patients suspected of infection or sepsis who show high-risk findings can be referred to as having RED FLAG SEPSIS.

Table 1: Risk stratification tool for adults aged 12 and over with infection and clinical suspicion of sepsis

Category	High-risk criteria	Moderate- to high-risk criteria	Low-risk criteria
History or Central Nervous System (CNS) examination	Response to voice/pain only or unresponsive Risk of neutropenia (recent chemotherapy)	History from patient, friend or relative of new onset of altered behaviour or mental state Persistent family/ whānau concern	Normal behaviour
Respiratory	Raised respiratory rate: 25 breaths per minute or more New need for oxygen to maintain saturation more than 92% (or more than 88% in known chronic obstructive pulmonary disease)	Raised respiratory rate: 21–24 breaths per minute	No high risk or moderate- to high-risk criteria met
Blood pressure	Systolic blood pressure 90 mmHg or less or systolic blood pressure more than 40 mmHg below normal	Systolic blood pressure 91–100 mmHg	No high risk or moderate- to high-risk criteria met
Circulation and hydration	Raised heart rate: 130 beats per minute or higher	Raised heart rate: 91–129 beats per minute (for pregnant women 100–129 beats per minute) or new onset arrhythmia	No high risk or moderate- to high-risk criteria met

Category	High-risk criteria	Moderate- to high-risk criteria	Low-risk criteria
Temperature		Tympanic temperature less than 36°C	
Skin	Skin ashen/mottled or non-blanching rash		

Table 2: Risk stratification tool for children aged 11 and under with infection and clinical suspicion of sepsis

Category	High-risk criteria	Moderate- to high-risk criteria	Low-risk criteria
History or CNS examination	Reduced Glasgow Coma Scale score / change in mental status Confused, difficult to rouse, irritable	Persistent family/whānau/ caregiver concern Acute unilateral or bilateral leg pain Significant cardiac, respiratory or neuro-disability	Normal behaviour and appearance
Respiratory	Persistent, severe or unexplained tachypnoea	Moderate tachypnoea Oxygen saturation <92% on air	Normal respiratory rate and oxygen saturation in room air
Circulation and hydration	Severe tachycardia (age-appropriate PEWS red zone) Persistent or unexplained tachycardia despite structured assessment and treatment	Moderate tachycardia	No tachycardia
Temperature		Rigors or temperature >39ºC	
Skin	Perfusion changes (mottled/cold extremities / capillary refill three seconds or more)		

Table 3: Risk stratification tool for people who are pregnant or up to six weeks post-pregnancy with infection and clinical suspicion of sepsis

Category	High-risk criteria	Moderate- to high-risk criteria	Low-risk criteria
History or CNS examination	Response to voice/pain only OR unresponsive	History from patient, friend or relative of new onset of altered behaviour or mental state Persistent family/ whānau/caregiver concern Prolonged rupture of membranes (>24 hours) Close contact with a person with symptomatic group A streptococcal infection Malodorous vaginal discharge Non-reassuring cardiotocogram or fetal tachycardia >160 Invasive procedure or termination of pregnancy in last six weeks	Normal behaviour
Respiratory	Raised respiratory rate: 25 breaths per minute or more New need for oxygen to maintain saturation more than 92% (or more than 88% in known chronic obstructive pulmonary disease)	Raised respiratory rate: 21–24 breaths per minute or respiratory distress	No high risk or moderate- to high-risk criteria met
Blood pressure	Systolic blood pressure 90 mmHg or less or systolic blood pressure more than 40 mmHg below normal	Systolic blood pressure 91–100 mmHg	No high risk or moderate- to high-risk criteria met

Category	High-risk criteria	Moderate- to high-risk criteria	Low-risk criteria
Circulation and hydration	Raised heart rate: 130 beats per minute or higher	Raised heart rate: 100–129 beats per minute or new onset arrhythmia	No high risk or moderate- to high-risk criteria met
Temperature		Tympanic temperature less than 36°C or above 39ºC	
Skin	Skin ashen/mottled or non-blanching rash		

4.3 Recognise that people aged 12 years and over with suspected sepsis and any high-risk symptoms or signs listed in Table 1 are at risk of death from sepsis. Where it can be clearly documented that no urine has been passed in the previous 18 hours (or, for catheterised patients, that the patient has passed less than 0.5 mL/kg/hour), this can be used as evidence of a high-risk presentation/RED FLAG.

4.4 Recognise that adults and young people aged 12 years and over with suspected sepsis and any of the moderate- to high-risk symptoms or signs listed in Table 1 are at moderate- to high-risk of severe illness or death.

4.5 If, after careful clinical assessment, adults and young people aged 12 years and over with evidence of infection do not meet any high or moderate- to high-risk criteria for sepsis, they can be considered to be at low-risk of severe illness or death due to sepsis. People with suspected or confirmed infection should be reassessed if they develop any new symptoms or signs of concern.

5. Temperature in suspected sepsis

5.1 Do not use a person's temperature to rule sepsis either in or out. Some people who do have sepsis may not develop a raised temperature. These include:

- people who are older or very frail
- people having treatment for cancer
- people severely ill with sepsis
- young infants or children.

5.2 Consider also that a rise in temperature can be a normal physiological response (e.g., after surgery or trauma).

6. Heart rate in suspected sepsis

6.1 Interpret the heart rate of a person with suspected sepsis in context, taking into account that:

- the baseline heart rate may be lower in young people and adults who are fit
- the baseline heart rate in pregnancy is 10–15 beats per minute more than normal

- older people with an infection may not develop an increased heart rate
- older people may develop a new arrhythmia in response to infection rather than an increased heart rate
- heart rate response may be affected by medicines such as beta-blockers.

6.2 Refer to notes on tachycardia in children in recommendation 13 below: Managing and treating suspected sepsis in children aged 11 years and under in acute hospital settings.

7. Blood pressure in suspected sepsis

7.1 Interpret blood pressure in the context of a person's previous blood pressure, if known, or anticipated blood pressure (eg known hypertension or pregnancy). Be aware that the presence of normal blood pressure does not exclude sepsis in adults, children and young people.

8. Confusion, mental state and cognitive state in suspected sepsis

8.1 Interpret a person's mental state in the context of their normal function and treat changes as being significant.

8.2 Be aware that changes in cognitive function may be subtle; assessment should include history from patient and family/whānau or carers.

8.3 Take into account that changes in cognitive function may present as changes in behaviour or irritability both in children and in adults with dementia.

8.4 Take into account that changes in cognitive function in older people may present as acute changes in functional abilities.

9. Oxygen saturation in suspected sepsis

9.1 Consider that if peripheral oxygen saturation is difficult to measure in a person with suspected sepsis, this may indicate poor peripheral circulation because of shock.

9.2 Take into account that skin pigmentation can cause peripheral oximeters to overestimate oxygen saturation.[3] Arterial blood gas monitoring may be required to clarify the true oxygen saturation.

10. Managing suspected sepsis outside acute hospital settings

10.1 *Refer all people with suspected sepsis outside acute hospital settings for emergency medical care by the most appropriate means of transport (usually via ambulance) if:

- they meet any high-risk (RED FLAG) criteria (see relevant tables) or
- there is a concern that the person would be unable to return with new or worsening symptoms

[3] Al-Halawani R, Charlton PH, Qassem M, et al. 2023. A review of the effect of skin pigmentation on pulse oximeter accuracy. *Physiological Measurement* 44(5): 05TR01.

- one or more moderate- to high-risk criteria are present and there is increased concern for sepsis and/or lack of improvement after a period of observation.

10.2 If a definitive diagnosis is not reached, or the person cannot be treated safely outside an acute hospital setting, refer them urgently for care.

10.3 For people with infection who do not have any high or moderate- to high-risk criteria who are being treated for infection, provide information about sepsis symptoms and how to access medical care if they are concerned (use dedicated written patient resources).

11. Managing and treating suspected sepsis in adults and young people aged 12 and over in acute hospital settings

11.1 For adults and young people aged 12 years and over who have suspected sepsis and one or more high-risk/RED FLAG criteria, complete the sepsis resuscitation bundle (Sepsis Six), as follows:

- Give oxygen if peripheral oxygen saturation is ≤92%. The target saturation is ≥94% (88–92% if the person is a known carbon dioxide retainer).
- Draw blood cultures prior to antibiotics. Send at least two sets from a single site, even if patient is afebrile. Ensure all bottles are properly filled with 8–10 ml in each bottle. Follow strict aseptic technique to avoid contamination. Do not collect blood cultures during the insertion of a peripheral cannula. Send additional blood cultures from indwelling vascular catheters and from a separate venepuncture site if you suspect endocarditis.
- Obtain a serum lactate and take blood tests, including a full blood count; U & E's (urea, and electrolytes); liver function tests; and a coagulation profile. A C-reactive protein test may be useful in adults and people who are pregnant but is not recommended as part of the initial assessment of suspected sepsis in children. Abnormal venous lactate measurements are considered significant (arterial measurements are not required).
- Give IV fluids: see recommendation 15 below.
- Give IV antibiotics. Give a broad-spectrum antimicrobial at the maximum recommended dose without delay, and within one hour of identifying that a person meets any high-risk/RED FLAG criteria in an acute hospital setting. Use a sepsis-specific guideline to ensure that pathogens causing sepsis are treated based on the presenting clinical syndrome and guidance provided by local antimicrobial stewardship teams.
- Get help. Inform a senior clinician that your patient has RED FLAG sepsis. Senior clinicians include senior medical officers, registrars, clinical fellows, nurse practitioners and senior midwives.

11.2 The role of the senior clinician is to ensure that:

- appropriate antimicrobial therapy is prescribed
- necessary investigations, procedures and referrals are made urgently
- diagnoses alternative to sepsis are appropriately considered.

- For adults and young people aged 12 years and over with suspected sepsis, any high-risk criteria and either a lactate over 4 mmol/litre or systolic blood pressure less than 90 mmHg, give IV fluid bolus without delay (within one hour of identifying that they meet high-risk/RED FLAG criteria in an acute hospital setting), in line with the recommendations below.

11.3 Include critical care in decision-making regarding the need for central venous access and appropriate vasoactive support. For adults and young people aged 12 years and over with suspected sepsis, any high-risk criteria and a lactate between 2 and 4 mmol/litre, give IV fluid bolus without delay (within one hour of identifying that they meet any high-risk criteria in an acute hospital setting), in line with the recommendations below.

11.4 For adults and young people aged 12 years and over with suspected sepsis, any high-risk criteria and lactate below 2 mmol/litre, consider giving IV fluid bolus, in line with the recommendations below.

11.5 Monitor people with suspected sepsis who meet any high-risk criteria continuously, or a minimum of once every 30 minutes, depending on setting. Use an EWS to monitor all adult patients in acute hospital settings. Unless you are instructed otherwise by a senior medical officer, EWS modification for acute, sepsis-related physiology is not appropriate (as it would inappropriately lower the EWS).

11.6 Monitor the mental state of young people and adults aged 12 years and over with suspected sepsis. Consider using a scale such as the Glasgow Coma Scale or the AVPU (‘alert, voice, pain, unresponsive’) scale for this.

11.7 Alert a consultant to attend in person if an adult or young person aged 12 years or over with suspected sepsis and any high-risk criteria fails to respond within one hour of initial antibiotic and/or IV fluid resuscitation. Failure to respond is indicated by any of the following:

- systolic blood pressure persistently below 90 mmHg
- reduced level of consciousness despite resuscitation
- a respiratory rate of over 25 breaths per minute or a new need for mechanical ventilation
- lactate not significantly reduced after one hour (eg, by more than 20% of the initial value).

11.8 For adults and young people aged 12 years and over with suspected sepsis who meet two or more moderate- to high-risk criteria (AMBER FLAGS), carry out the following blood tests:

- a minimum of two sets of blood cultures, appropriately filled, taking precautions to avoid contamination
- a full blood count
- urea and electrolytes
- creatinine
- a coagulation profile
- lactate.

11.9 Continue to monitor the patient carefully and arrange for a senior clinician to review the person's condition and lactate results within one hour of their meeting the criteria in an acute hospital setting.

11.10 For adults and young people aged 12 years and over with suspected sepsis who initially meet two or more moderate to high-risk criteria and are then found to have new RED FLAGS (including a lactate over 2 mmol/litre) or evidence of acute kidney injury, treat the patient as high-risk and follow the recommendations in 1.11 above.

11.11 Acute kidney injury can be detected using (p)RIFLE (paediatric Risk, Injury, Failure, Loss, End-stage renal disease), AKIN (Acute Kidney Injury Network) or KDIGO (kidney disease: Improving Global Outcomes) definitions, by using any of the following criteria:

- a rise in serum creatinine of 26 mmol/litre or greater within 48 hours
- a 50% or greater rise in serum creatinine known or presumed to have occurred within the past seven days
- a fall in urine output to less than 0.5 ml/kg/hour for more than six hours in adults and more than eight hours in children and young people
- a 25% or greater fall in eGFR in children and young people within the past seven days.

11.12 For adults and young people aged 12 and over with suspected sepsis who meet two or more moderate- to high-risk criteria, have lactate of less than 2 mmol/litre and have no evidence of acute kidney injury in whom a definitive condition cannot be identified, and who do not develop high-risk (RED FLAG) findings on review:

- repeat structured assessment at intervals
- ensure review by a senior clinician within three hours of their meeting two or more moderate- to high-risk criteria
- make an antibiotic prescribing decision within three hours of their meeting two or more moderate- to high-risk criteria
- update the patient and their family/whānau
- exit the sepsis pathway.

11.13 For adults and young people aged 12 years and over with suspected sepsis who meet two or more moderate- to high-risk criteria, have lactate of less than 2 mmol/litre and have no evidence of acute kidney injury in whom a definitive condition or infection can be identified and who do not develop high-risk (RED FLAG) findings on review:

- manage the definitive condition
- make an antibiotic prescribing decision within three hours of their meeting two or more moderate- to high-risk criteria
- update the patient and their family/whānau
- exit the sepsis pathway.

12. Adults and young people aged 12 years and over with suspected sepsis who meet only one moderate- to high-risk criterion

12.1 For adults and young people aged 12 years and over with suspected sepsis who meet only one moderate- to high-risk (AMBER FLAG) criterion:

- provide appropriate care based on diagnosis, condition, local resources and available clinical expertise
- document a treatment plan
- if antibiotic is needed, administer within three hours
- update the patient and their family/whānau
- exit the sepsis pathway if no further moderate- to high-risk (AMBER FLAG) criteria are identified.

12.2 For adults and young people aged 12 years and over who have met screening criteria but who do not meet any high-risk (RED FLAG) or moderate- to high-risk (AMBER FLAG) criteria:

- arrange clinical assessment and manage according to clinical judgement
- exit the sepsis pathway.

13. Managing and treating suspected sepsis in children aged 11 years and under in acute hospital settings

Children aged 11 years and under with suspected infection who meet one or more high-risk criteria (RED FLAGS)

13.1 For children who have a fever and look unwell, use the Paediatric Sepsis Pathway tool. If the child meets the in-hospital criteria with one or more RED FLAG criteria, follow these steps.

- Arrange for immediate review and consider informing a senior clinician early.
- Apply oxygen to achieve sats >94%.
- Obtain IV/IO access and send blood investigations: blood gas (including glucose and lactate measurement), blood culture, a full blood count, urea and electrolytes, creatinine and a coagulation profile.
- Give 10ml/kg fluid bolus with 0.9% saline:
  - neonate: 10 ml/kg
  - infant or child: 10–20ml/kg.

13.2 Reassess and repeat as clinically indicated. Assess perfusion and fluid response, and for signs of volume overload after each bolus.

13.3 Give a broad-spectrum antimicrobial at the maximum recommended dose without delay within one hour of identifying that they meet any RED FLAG criteria in an acute hospital setting. Use a specific guideline if one is available.

13.4 Consider vasoactive agents early. For neonates, discuss with the neonatologist/ paediatrician after 10 ml/kg fluid bolus. For infants and children, if perfusion is abnormal after 20–40 ml/kg fluid, consider vasoactive support in discussion with the paediatrician or intensive care specialist.

13.5 In terms of assessment for possible sepsis in children, note the following.

- Tachycardia is common in febrile children. However, tachycardia accompanying symptoms or signs of infection that are severe (defined using the age-appropriate PEWS vital sign chart), unexplained or persistent (ie, following initial management of pain and fever with paracetamol and cooling cares) should be considered a high-risk (RED FLAG) finding.
- Caregiver concern is an indicator of serious illness in children that often precedes significant vital sign abnormalities. Review caregiver concern regularly and escalate persistent caregiver concern to a senior clinician.

Children aged 11 and under with suspected infection who meet one or more moderate- to high-risk criteria (AMBER FLAGS)

13.6 In the case of children aged 11 and under with suspected infection who meet one or more moderate- to high-risk criteria, respond as follows.

- Review with a senior clinician, as defined in the sepsis clinical pathway.
- Send blood tests (full blood count; urea, creatinine and electrolytes; blood gas; blood culture; and coagulation studies) and review results within one hour.
- Manage according to the high-risk (RED FLAG) pathway any child who is deteriorating or who is found to have a serum lactate >4 mmol/litre.
- If there is no clinical change and/or the serum lactate is 2–4 mmol/litre, prolong observation and conduct a further structured clinical assessment within two hours. If antibiotics are needed, administer within three hours of presentation.
- Exit the sepsis pathway for any child who is clinically improving with a lactate < 2mmol/litre.

14. Antibiotic treatment in people with suspected sepsis

14.1 Pre-alert secondary care (through the general practitioner or ambulance service) when any high-risk (RED FLAG) criteria are met in a person with suspected sepsis outside of an acute hospital and transfer them immediately.

14.2 Ensure urgent assessment mechanisms are in place to deliver antibiotics when any high-risk criteria are met in secondary care (within one hour of meeting a high-risk criterion in an acute hospital setting).

14.3 Ensure general practitioners and ambulance services have mechanisms in place to give antibiotics to people with high-risk criteria in pre-hospital settings in locations where the transfer time is more than 30 minutes.

14.4 For people with suspected sepsis, take a minimum of two sets of blood cultures from one venepuncture before or concurrently with antimicrobial administration.

14.5 Use a sepsis-specific antimicrobial guideline where one is available.

14.6 For all people given antibiotics for suspected sepsis, review antimicrobial prescribing regularly, and with the results of microbiology samples once they are available.

15. IV fluids in people with suspected sepsis

15.1 If patients aged over 16 years need IV fluid resuscitation, use crystalloids that contain sodium in the range 130–154 mmol/litre, with a bolus of 500 mL over less than 15 minutes.

15.2 If children and young people aged up to 16 years need IV fluid resuscitation, use crystalloids that contain sodium in the range 130–154 mmol/litre, with a bolus of 20 mL/kg over less than 10 minutes. Take into account pre-existing conditions (eg, cardiac disease or kidney disease), because smaller volumes may be needed.

15.3 If neonates need IV fluid resuscitation, use glucose-free crystalloids that contain sodium in the range 130–154 mmol/litre, with a bolus of 10–20 mL/kg over less than 10 minutes.

15.4 Reassess the patient after completion of the IV fluid bolus, and if there is no improvement, give a second bolus. If there is no improvement after the second bolus, see guidance on management of persistent hypoperfusion (recommendation 19 below) and alert a senior clinician to attend.

15.5 Use a volumetric pump, or syringe driver if no volumetric pump is available, to deliver IV fluids for resuscitation to children aged 11 years and under with suspected sepsis who need fluids in bolus form.

15.6 If using a volumetric pump or floc controller to deliver IV fluids for resuscitation to adults and young people aged 12 years and over with suspected sepsis who need fluids in bolus form, ensure device is capable of delivering fluid at the required rate (ie, at least 2000 mL/hour).

15.7 Do not use gelatins or hydroxyethyl starches for fluid resuscitation for people with sepsis.

15.8 Consider human albumin solution 4–5% for fluid resuscitation only in patients with sepsis and shock.

16. Using oxygen in people with suspected sepsis

16.1 Give oxygen to achieve a target saturation of 94−98% for adult patients, or 88−92% for those at risk of hypercapnic respiratory failure.

16.2 Oxygen should be given to children with suspected sepsis who have signs of shock or peripheral oxygen saturation of less than 91% when breathing air. Treatment with oxygen should also be considered for children with a peripheral oxygen saturation of greater than 92%, as clinically indicated.

16.3 Be aware that skin pigmentation can cause peripheral oximeters to overestimate oxygen saturation. Arterial blood gas monitoring may be required to clarify the true oxygen saturation.

17. *Finding the source of infection in people with suspected sepsis*

17.1 Carry out a thorough clinical examination to look for sources of infection, including sources that might need surgical drainage, as part of the initial assessment.

17.2 Tailor investigations of the sources of infection to the person's clinical history and findings on examination.

17.3 Consider urine analysis and chest X-ray to identify the source of infection in all people with suspected sepsis.

17.4 Consider cross-recommendation imaging of the abdomen and pelvis if no likely source of infection is identified after clinical examination and initial tests.

17.5 Involve the adult or paediatric surgical or gynecological teams early if you suspect intra-abdominal or pelvic infection.

17.6 Do not perform a lumbar puncture without consultant instruction if any of the following contraindications are present:

- signs suggesting raised intracranial pressure or a reduced or fluctuating level of consciousness (a Glasgow Coma Scale score less than 9 or a drop of 3 points or more)
- relative bradycardia and hypertension
- focal neurological signs
- abnormal posture or posturing
- unequal, dilated or poorly responsive pupils
- papilloedema
- abnormal 'doll's eye' movements
- shock
- extensive or spreading purpura
- after convulsions until stabilised
- coagulation abnormalities or coagulation results outside the normal range or platelet count below 100×109/litre or receiving anticoagulant therapy
- local superficial infection at the lumbar puncture site
- respiratory insufficiency in children.

17.7 Perform lumbar puncture in the following children with suspected sepsis (unless contraindicated: see contraindications in recommendation 17.6)

- infants younger than one month
- all infants aged one to three months who appear unwell
- infants aged one to three months with a white blood cell count less than 5×109/litre or greater than 15×109/litre.

18. Special considerations for people who are pregnant presenting with sepsis and septic shock

18.1 Inform a midwife and consultant obstetrician of suspected sepsis as part of delivering the sepsis resuscitation bundle (Sepsis Six).

18.2 Assess fetal state and consider delivery or evacuation of retained products of conception.

18.3 Prescribe thromboprophylaxis if appropriate.

19. Reassessment of patients following administration of the sepsis resuscitation bundle (Sepsis Six)

19.1 For patients who received the sepsis resuscitation bundle (Sepsis Six), document clinical response by performing a structured clinical assessment within three hours of bundle delivery.

19.2 Assess global clinical response, specifically for the following signs of tissue hypoperfusion:

- decreased or falling level of consciousness
- persistent or new hypotension (systolic blood pressure <90 mmHg or >40 mmHg below patient's normal blood pressure)
- persistent or new tachypnoea (respiratory rate >25 or respiratory distress)
- persistent or new elevation of serum lactate (ie, 20% reduction if raised at presentation; a new serum lactate of >2 if initially in the normal range).

19.3 If there are any new, persistent or worsening signs of clinical deterioration or tissue hypoperfusion, inform a senior clinician (as defined in the relevant sepsis pathway document) and ensure they attend the patient to:

- review investigations, laboratory results and sub-specialty advice
- consider goals of care and ensure that treatment escalation remains appropriate – if in any doubt, do not delay efforts to restore tissue perfusion
- arrange urgent source control and definitive care, involving all relevant sub-specialty senior medical officers and interventional radiology (if needed)
- discuss the patient with the on-duty intensive care unit (ICU) or retrieval service
- prescribe appropriate haemodynamic management, including appropriate fluid bolus and/or vasoactive medication.

19.4 If the patient is in a peripheral hospital and accepted for ICU admission and/or retrieval:

- commence supportive therapies in consultation with the ICU or retrieval team
- arrange insertion of arterial and central venous catheters in preparation for administration of vasoactive medication, under the direction of the ICU or retrieval team
- consider asking skilled local resources to assist with patient management (eg, an onsite anaesthetist)

- arrange critical care retrieval or transport to an appropriate facility, with accepting team approval.

19.5 If the patient is in a hospital with ICU capability:

- commence supportive therapy in consultation with the ICU team
- arrange transfer to the ICU or an appropriate in-patient destination.

19.6 Reassess the patient regularly with the aim of achieving the following:

- mean arterial pressure of >65 mmHg or a target deemed sufficient to maintain tissue perfusion
- oxygen saturation of >94% or a target appropriate to maintain tissue oxygenation in patients with pre-existing type II respiratory failure
- urine output acceptable to the treating sub-specialty team
- clinically adequate source control
- appropriate supportive care.

20. Information and support for people with sepsis and their family/whānau and carers

People who have sepsis and their families and carers

20.1 Ensure a care team member is nominated to give information to family/whānau and carers, particularly in emergency situations, such as in the emergency department. This information should include:

- an explanation that the person has sepsis, and what this means
- an explanation of any investigations and the management plan
- regular and timely updates on treatment, care and progress.

20.2 Give information without using medical jargon. Check regularly that people understand the information you are giving.

20.3 Give people with sepsis and their family/whānau members and carers opportunities to ask questions about diagnosis, treatment options, prognosis and complications. Be willing to repeat information.

21. People with infection and high-risk criteria at presentation who are not diagnosed with sepsis

21.1 Give people who have been assessed for sepsis but have been discharged without a diagnosis of sepsis (and their families/whānau and carers, if appropriate) verbal and written information about:

- what sepsis is, and why it was suspected
- what tests and investigations have been done
- which symptoms to monitor after discharge
- when to get medical attention if their illness continues or relapses
- how to get medical attention if they need to seek help urgently.

Information at discharge for people at increased risk of sepsis

21.2 Ensure people who are at an increased risk of sepsis (eg, after surgery) are told before discharge about symptoms that should prompt them to get medical attention and how to access that medical attention.

Information at discharge for people who have had sepsis and septic shock

21.3 Ensure people who have had sepsis (and their families/whānau and carers, if appropriate) know that they have had it.

21.4 Ensure that discharge notifications to general practitioners include the diagnosis of sepsis.

21.5 Give people who have had sepsis (and their families/whānau and carers, if appropriate) opportunities to discuss concerns. These may include:

- why they developed sepsis
- whether they are likely to develop sepsis again
- whether more investigations are necessary
- details of any community care needed; for example, related to peripherally inserted central venous catheters or other IV catheters
- what they should expect during recovery
- arrangements for follow-up, including specific critical care follow-up if relevant
- possible short-term and long-term problems.

21.6 Advise carers, they have a legal right to have a carer's assessment of their needs and advise them on how to obtain this.

22. Training and education

22.1 Ensure all health care staff and students involved in assessing people's clinical condition are given regular, appropriate training in identifying people who might have sepsis. This includes primary care, community care and hospital staff, and those working in care homes.

22.2 Ensure all health care professionals involved in triage or early management are given regular appropriate training in identifying, assessing and managing sepsis. This should include:

- risk stratification strategies
- local protocols for early treatments, including antibiotics and IV fluids
- criteria and pathways for escalation, in line with the health care setting.