

Adult Inpatient Suspected Sepsis Guidelines

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Overview

Purpose

The purpose of this document is to provide guidance to clinicians relating to the identification and treatment of adult patients with suspected or confirmed sepsis. The guidelines have been designed to facilitate timely care; it supports and does not replace clinical judgment.

Scope

This document applies to all staff involved in the care of adult inpatients with suspected or confirmed sepsis.

Definition¹

Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection.

Organ dysfunction can be represented by an increase in the Sequential [Sepsis-related] Organ Failure Assessment (SOFA) score of 2 points or more, and is associated with in-patient mortality greater than 10%.

¹ Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, Bellomo R, Bernard GR, Chiche J, Coopersmith CM, Hotchkiss RS, Levy MM, Marshall JC, Martin GS, Opal SM, Rubenfeld GD, van der Poll T, Vincent J, Angus DC. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). *JAMA*. 2016;315(8):801-810. doi:10.1001/jama.2016.0287

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Therefore sepsis can be considered as confirmed or suspected in the presence of infection + increase in SOFA score of 2 or more.

A simplified, bedside severity assessment score called the qSOFA can be used as a screening tool. It utilises 3 clinical criteria low blood pressure (SBP \leq 100 mmHg), high respiratory rate (\geq 22 breaths per min), or altered mentation (Glasgow coma scale $<$ 15) 1 point is assigned for each positive variable. A score of 2 or more appears to correlate well with organ dysfunction and SOFA score of 2 or more.

Septic shock is defined as a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone.

Patients with septic shock can be clinically identified by a vasopressor requirement to maintain a mean arterial pressure of 65 mm Hg or greater and serum lactate level greater than 2 mmol/L ($>$ 18 mg/dL) in the absence of hypovolemia. This combination is associated with hospital mortality rates greater than 40%.

Identification of suspected sepsis

Suspect Infection – Suspect Sepsis In patients with signs or symptoms that indicate possible infection, think 'could this be sepsis'? Assess people with any suspected infection to identify:

- possible source of infection
- factors that increase risk of sepsis

Use a structured set of observations in a face-to-face setting to:

- stratify if sepsis is suspected
- assess the urgency and seniority of medical/surgical assessment
- assess urgency of treatment

1. Identification of potential source of infection

Where possible, identify source to optimise antimicrobial treatment. Examples of common infection sites are:

- device-related infection e.g. IV luer, PICC, IUD
- pneumonia
- urinary tract infection
- abdominal infection
- meningitis
- cellulitis / septic arthritis / infected wound

If an infection source cannot be identified, consider common risk factors for infection:

- trauma / surgery / invasive procedure within 6 weeks
- recent delivery / breast feeding

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- impaired immunity due to illness or drugs e.g. diabetes, people receiving steroids, chemotherapy or immunosuppressant's
- aged above 75 years or frail or recent fall

If no obvious source of infection can be identified, and there is still high clinical concern in the absence of obvious risk factors, further investigations should be considered.

Note: These are not exhaustive lists of infections or risk factors; they are intended to prompt consideration of common infection sites and risk factors. Possible sepsis should be approached with a high index of suspicion, and these lists are intended to support, not replace, clinical judgment.

2. Risk stratification for sepsis

Use the patient's history and physical examination results to complete a sepsis screen and grade their risk of severe illness or death from sepsis using the following criteria:

Category	High risk criteria	Moderate risk criteria
Mental Status	Responds only to voice or pain/ unresponsive	Altered mental status
Blood pressure	SBP \leq 90 mmHg	SBP 91 to 100mmHg
Respiratory	Respiratory rate \geq 22 per min OR Needs oxygen to keep SpO ₂ \geq 92%	
Circulation	>130 bpm	100 to 130 bpm OR new onset arrhythmia
Hydration	Not passed urine > 18 hours (not catheterised) Catheterised patients: <10ml/hr	Not passed urine > 12 hours (not catheterised) Catheterised patients: <30ml/hr
Temperature		Tympanic temperature <36 or >38
Lactate		>2
White Cell Count		>12 or <4

Patients with a confirmed or suspected infection and significant risk factors have a high risk of poor outcomes. Clinical teams should respond with urgency.

A. Confusion, mental and cognitive state

- Interpret a person's mental state in the context of their normal function and treat changes as being significant
- Be aware that changes in cognitive function may be subtle and assessment should include history from patient and family or carers

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- Take into account that changes in cognitive function may present as:
 - changes in behaviour or irritability in adults with dementia
 - acute changes in functional abilities in older adults

B. Oxygen saturation

- Consider that if peripheral oxygen saturation is difficult to measure in a person with suspected sepsis, this may indicate poor peripheral circulation or poor cardiac output
- Consider use of ear probes
- Consider arterial blood gas

C. Circulation

- Interpret the heart rate of a person with suspected sepsis in context, taking into account that:
 - baseline heart rate may be lower in young people and adults who are fit
 - 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

D. Temperature

- Do not rely on fever or hypothermia to rule sepsis either in or out
- Ask the person with suspected sepsis and their family or carers about any recent fever or rigors
- Consider that some groups of people with 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
- Consider that a rise in temperature can be a physiological response, for example after surgery or trauma

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Screening and Treating Suspected Sepsis

Patients with a confirmed or suspected infection and significant risk factors have a high risk of poor outcomes. Clinical teams should respond with urgency.

For all patients with suspected sepsis, nursing observations must be increased to a minimum of hourly. Medical/surgical review timeframes align with the Early Warning Score (NEWS) deteriorating patient algorithm.

The five components of screening and treating suspected sepsis are:

- [Rapid medical/surgical assessment](#)
- [Taking of cultures, blood samples and monitoring of urine output](#)
- [Prescription and administration of oxygen, fluids and antibiotics](#)
- [Consideration of appropriate source control](#)
- [Review and escalation of clinical care as required](#)

1. Rapid medical/surgical assessment

For patients with ≥ 1 high risk factors OR ≥ 2 moderate risk factors:

- Medical/surgical house officer review must be completed within 30 minutes
- Critical Care Outreach team must be contacted

For patients with 1 moderate risk factor

- Medical/surgical house officer assessment must be completed within 1 hour

2. Blood samples, cultures, and monitoring of urine output

For all patients, ensure the following is completed prior to antibiotic administration

- **Blood Samples:**
 - blood gas including glucose and lactate measurement
 - blood culture
 - full blood count
 - c-reactive protein
 - urea and creatinine
 - LFTs (including ALT and ALP)
 - electrolytes, (including total protein and albumin)
 - clotting screen

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- **Cultures:**
 - Take 2 sets of blood cultures as per Waitemata DHB policy
 - Consider MSU for all patients
 - Consider syndrome specific cultures, such as sputum and/or CSF
 - Consider wound/aspirate cultures
- **Monitor urine output:**
 - Consider patient may require a catheter
 - Ensure fluid balance chart completed hourly

3. Prescription and administration of oxygen, fluids and antibiotics

For patients with ≥ 1 high risk factors OR ≥ 2 moderate risk factors:

- Do not wait for blood results to prescribe treatment
- Oxygen, fluids and antibiotics to be administered within 1 hour

For patients with 1 moderate risk factor:

- Review blood work lab results for further risk factors for poor outcomes:
 - lactate greater than 2 and/or
 - white cell count >12 or <4
- If risk factors present, administer oxygen, fluids and antibiotics within 1 hour

Oxygen: Aim to keep sats $> 92\%$ (88-92% if at risk of CO₂ retention e.g. COPD)

IV fluids: Ensure maintenance fluids Minimum 1ml/kg/hr. Commence fluid challenge regime. If still hypotensive despite fluid bolus regime, consider ICU admission and/or vasopressors

Antimicrobials: Refer to:

Known Origin: Suspected Sepsis Empiric Treatment

Unknown Origin: Suspected Sepsis Empiric Treatment

Full Antibiotic Guidelines (links to be added)

A. Oxygen

- Oxygen is considered a drug which must be prescribed
- Oxygen is prescribed for hypoxaemia which is defined as an SaO₂ $<90\%$
- Oxygen should be administered in an emergency and prescription obtained later

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- Patients should have a target saturations range with upper limit. For most patients this will be > 92% OR 88-92% for those at risk of hypercapnic respiratory failure

B. Intravenous fluids

- Ensure maintenance fluids (minimum 1ml/kg/hr)
- Commence fluid challenge regime through repeated boluses:
 - 200-500ml boluses of 0.9% normal saline over 15 minutes to a total of 1L initially
 - Monitor response to each fluid bolus (BP, HR, urine output, oxygen saturation and overall fluid status)
 - If urine output <0.5ml/kg/hr, monitor closely for acute signs of volume overload and seek early senior and ICU outreach review
 - If no improvement after first round of 1L fluid boluses, alert a consultant/registrar to attend
 - Repeat fluid boluses up to 30ml/kg over 3-6 hours (potentially including human albumin solution)
- If still hypotensive despite above fluid bolus regime, consider ICU admission and/or vasopressors

C. Antimicrobials

- Ensure urgent assessment mechanisms are in place to deliver antimicrobials within 1 hour when any high risk criteria met
- Take blood cultures and where possible other microbiology samples before administering antibiotics
- Neutropenic patients: Although adult patients with suspected sepsis at the time of neutropenia from a primary haematological disorder or chemotherapy can be identified and managed initially using this sepsis guideline, the empiric initial antibiotic treatment should include antipseudomonal antibiotics like Piperacillin/tazobactam and Meropenem. Please refer to the [full guideline for antibiotic recommendations](#).
- Review choice of antibiotics once microbiology results are known
- If meningitis is specifically suspected (fever and purpuric rash) give appropriate doses of intravenous ceftriaxone

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Known Origin: Suspected Sepsis Empiric Treatment

Where the source of suspected sepsis has been identified antibiotics should be prescribed in accordance with the existing [Antibiotic Guidelines](#). The first line antibiotic recommendations for common sources are below.

The full [Antibiotic Guideline](#) MUST be consulted for patients with allergies, MDRO colonisation, renal dysfunction, those that are at high risk and for further information.

Urinary	Cefuroxime 1.5g IV Q8H
Skin and Soft Tissue	Flucloxacillin 2g IV Q6H (if necrotising infection is suspected, urgent discussion with ID is required)
Severe Community Acquired Pneumonia	Amoxicillin/clavulanic acid 1.2g IV Q8H + Azithromycin 500mg PO daily
Aspiration Pneumonia	Amoxicillin/clavulanic acid 1.2g IV Q8H
Bacterial Meningitis	See full guideline
HSV Encephalitis	Aciclovir 10mg/kg IV Q8H (used IBW)
Acute Abdomen	Cefuroxime 1.5g IV Q8H + Metronidazole 500mg IV Q12H
Acute Abdomen with Suspected Perforation or post-op abdominal sepsis	Amoxicillin 1g IV Q6H + Gentamicin 5-7mg/kg (IBW) STAT + Metronidazole 500mg IV Q12H (For gentamicin prescribing refer to the Aminoglycoside Protocol)
Gynaecological	Cefoxitin 1-2g IV Q8H + Doxycycline 100mg PO BD
Neutropenic Patient	The antibiotic treatment of patients with neutropenic sepsis is dependent on a number of factors. Please refer to the full guideline

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Unknown Origin: Suspected Sepsis Empiric Treatment

The following information is to guide empiric treatment of sepsis when the source is unknown. It excludes the management of patients with neutropenic sepsis; for this please refer to the [Febrile Neutropenia Guideline](#). Please ensure you review the patient's prior microbiology and take this into consideration when making antibiotic selection.

Standard Regimen	Severe Penicillin Allergy
Cefuroxime 1.5g IV Q8H AND Gentamicin 5-7mg/kg (use IBW) STAT (For gentamicin prescribing refer to the Aminoglycoside Guideline)	Vancomycin – dose as per Vanculator AND Gentamicin 5-7mg/kg (use IBW) STAT (For gentamicin prescribing refer to the Aminoglycoside Guideline)
<ul style="list-style-type: none"> • Gentamicin may be given for a maximum of 48 hours, after which treatment should be discussed with ID (in accordance with the Aminoglycoside Guideline) • For patients with impaired renal function, dose adjustments are required according to the Aminoglycoside Guideline. 	
Patients with known multi-drug resistant organism (MDRO) colonisation	
ESBL	Meropenem 1g IV Q8H (if severe penicillin allergy discuss with ID)
MRSA/VRE	Standard Regimen

Empiric treatment should be reviewed daily. Once source and/or pathogen has been identified, antibiotic therapy should be appropriately modified. Please contact ID for advice regarding the management of complex patients.

Refer to full [Antibiotic Guideline](#) for further information

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4. Consideration of appropriate source control

Carry out a thorough clinical examination to look for sources of infection as part of the initial assessment. Tailor investigations of the sources of infection to the person's clinical history and findings on examination.

- Review all IV lines, catheters and drains for possible source of infection
- Consider imaging of the chest, abdomen and pelvis if no likely source of infection is identified after clinical examination and initial tests
- If radiological contrast is required in oliguric patients, administer IV fluids and stop nephrotoxic medications both pre- scan and post-scan
- Involve interventional radiology early if percutaneous drainage required or surgical drainage is likely to be hazardous
- Involve the surgical and gynaecological teams early on if intra-abdominal or pelvic infection is suspected in case surgical treatment is needed
- Review choice of antibiotics once microbiology results are known

5. Review and escalation of clinical care

For all suspected sepsis patients:

- Nursing observations to be completed hourly
- Medical/surgical house officer review to be completed within 1 hour after commencement of treatment

If the patient is not responding well to treatment, or there is continued clinical concern:

- Escalate to team Registrar and/or SMO for review within 30 minutes
- Contact ICU outreach to attend and support
 - North Shore Hospital 021 924 311
 - Waitakere Hospital 021 871 733
- Consider referral to ICU registrar for ICU/HDU admission

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Algorithm

