NT Health

Guideline

Due for review: 09/08/2028

Paediatric Acute Care Sepsis Recognition and Management

Contents

Applicability

This guideline must be considered by:

- Northern Territory (NT) Hospitals; Acute Care Services

This guideline must be used for the following:

- Paediatrics 0 to 17 years old

SEE SEPARATE DOCUMENT: ACUTE CARE PAEDIATRIC SEPSIS PATHWAY (two versions: Central Australia/Barkly Regions and Top End/East Arnhem/Big Rivers Regions) for easy reference to sepsis recognition, management and empiric antibiotic recommendations.

NORTHERN TERRITORY GOVERNMENT

Guideline statement

This guideline provides additional information to:

- Provide guidance for best practice for sepsis recognition and management,
- Where sepsis is suspected, empower staff to escalate care to clinicians experienced in recognising and managing sepsis,
- Empower staff to engage senior paediatrician in sepsis recognition and management of children,
- Support the provision of education and information to patient and carers.

Recommendations in this guideline are not intended to replace a clinician's good clinical judgement when presented with a patient with unique characteristics, and is not intended to set a standard for clinical care.

The guideline should be used in conjunction with an age specific NT Observation Chart and NT Health Paediatric Sepsis Pathway for Acute Care Facilities.

Policy suite

This guideline forms part of the following national ACSQHC Sepsis Clinical Care Standard suite for this topic. Related documents are also listed below:

- Sepsis Clinical Care Standard
- Antimicrobial Stewardship Clinical Care Standard
- Physiological Deterioration Patient Recognition and Management NT Health Policy
- Use of Observation Charts in Recognising and Responding to Clinical Deterioration NT Health Procedure
- Observations and Modified Early Warning Score (MEWS) ASH Procedure
- Adult Acute Care Sepsis Recognition and Management NT Health Guideline
- Adult Primary Health Care Sepsis Recognition and Management NT Health Guideline
- Paediatric Primary Health Care Sepsis Recognition and Management NT Health Guideline
- Sepsis and Septic Shock RDH ICU Medical Guideline
- NT Health Acute Care Adult TER/EAR/BRR Sepsis Pathway
- NT Health Acute Care Adult CAR/BR Sepsis Pathway
- NT Health Acute Care Paediatric TER/EAR/BRR Sepsis Pathway
- NT Health Acute Care Paediatric CAR/BR Sepsis Pathway
- NT Health Primary Health Care Adult Sepsis Pathway
- NT Health Primary Health Care Paediatric Sepsis Pathway

Guideline details

Introduction

The Third International Consensus Definitions for Sepsis (Sepsis-3):

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

Septic shock is sepsis with evidence of cardiovascular organ dysfunction: hypotension is a late sign. Septic shock is associated with a substantially higher mortality.

Sepsis is a time-critical medical emergency that arises when the body has a dysregulated response to an infection. This results in damage to the body's own tissues and organs, which can lead to septic shock and organ failure. Sepsis can be triggered by infections caused by bacteria, viruses, fungi, and parasites. Bacterial infections are the most common triggers.

Almost half of all global sepsis cases occur in children. The mortality rate for untreated septic shock is more than 80% and with treatment mortality rate is estimated at 15 to 20% in children. In Australia, Aboriginal and Torres Strait Islander children (median age was 1.7 years) are three times more likely to have sepsis that requires intensive care unit (ICU) admission. This reflects the social determinants of health and remoteness of the communities, coupled with transport issues to access medical care, which can result in poor health outcomes.

Early recognition of sepsis is crucial to treating children before their condition worsens and becomes fatal. Literature suggests sepsis improvement tools such as screening and management tools can significantly decrease the time to recognise and manage sepsis, resulting in better survival rates. The common themes of sepsis related deaths in the Northern Territory (NT) includes: patients of a young age, fit build, and delayed or missed sepsis recognition, diagnosis and administration of appropriate antibiotics.

Partnering with consumers

Involve the patient and/or caregiver in all the clinical decision-making and care planning process. This involves discussions during all stages of care from acute management, recovery and on discharge.

When appropriate, discuss goals of care and prognosis and incorporate patient and/or carer wishes into the treatment and end-of-life care planning.

Ensure the patient and/or carer receive information about sepsis and their care in a way they understand. Use Aboriginal Liaison Officers and Interpreters when needed or requested.

Provide consumer resources in written format where available. Refer to the staff intranet or internet sites to access local electronic resources.

Sepsis recognition

Lack of recognition prevents timely therapy. Sepsis screening is associated with earlier treatment.

Early recognition and prompt treatment of sepsis through a formalised screening effort is necessary to reduce mortality risk. Sepsis is not a specific illness but rather a syndrome that can be recognised by a constellation of clinical signs and symptoms in a patient with suspected infection. There is no gold standard diagnostic test that exists to identify sepsis.

Sepsis in children may not be obvious in every child, it may be non-specific and subtle. Children may exhibit different physiological abnormalities, therefore a diagnosis should be based on clinical judgment and may be supported by relevant investigations. It is important to pay attention to patient risk factors and increase your suspicion of sepsis in these patients.

Parental concern is a demonstrated "RED FLAG", particularly changes to mental status warrants a prompt clinical assessment.

In the Top End, sepsis can occur due to melioidosis, especially in the wet season. Consider melioidosis in all patients presenting with sepsis or septic shock. Please refer to the TEHS Melioidosis Guideline for diagnosis and management of melioidosis.

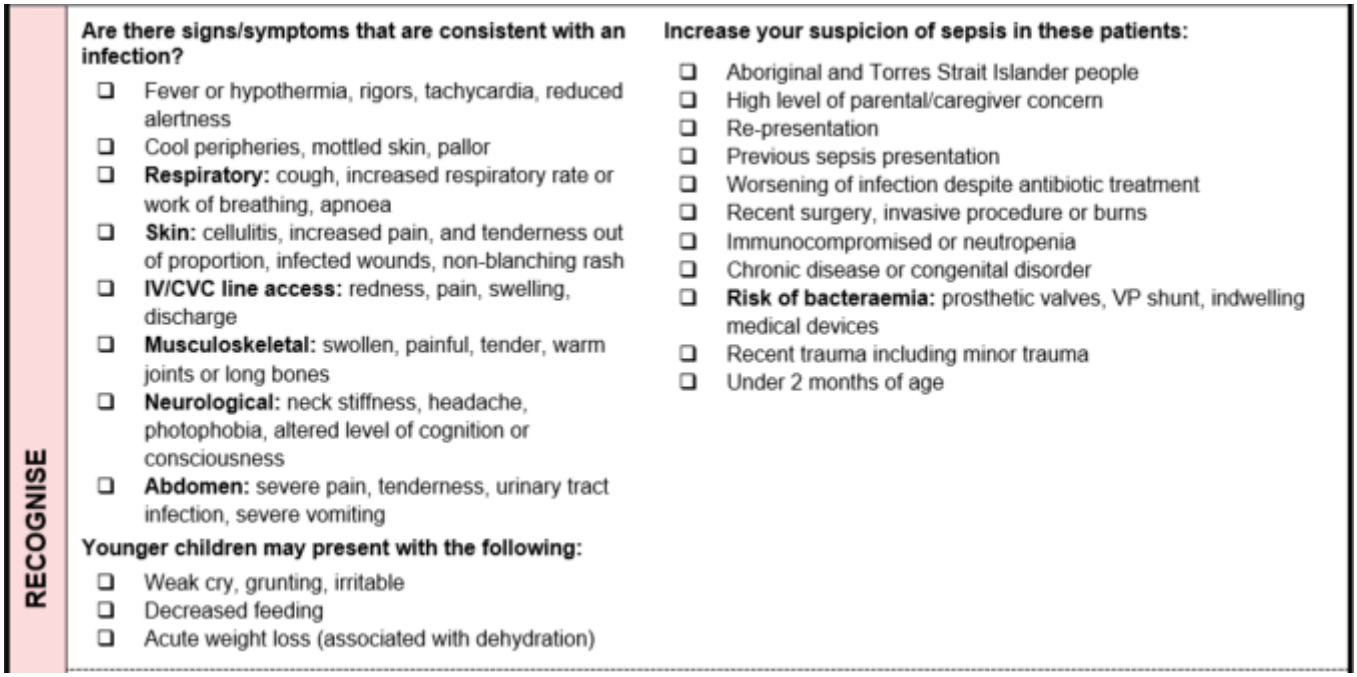
Could it be sepsis?

Screening for Sepsis should occur in all patients who have signs or symptoms of infection.

Sepsis or septic shock should be considered in a patient with a suspected or proven infection (as indicated by signs and symptoms in Figure 1) who presents with any of the following:

- Altered mental state
- Unwell appearance +/- non-blanching rash
- Abnormal vital signs and physiological indicators (Figure 2)
- Unexplained strong pain
- Toxin mediated signs which can include vomiting, diarrhoea, myalgia, conjunctival injection, confusion, collapse and a widespread erythematous rash. Toxin mediated sepsis is caused by superantigens from toxin-producing strains of *S. aureus* or Group A Streptococcus (GAS).

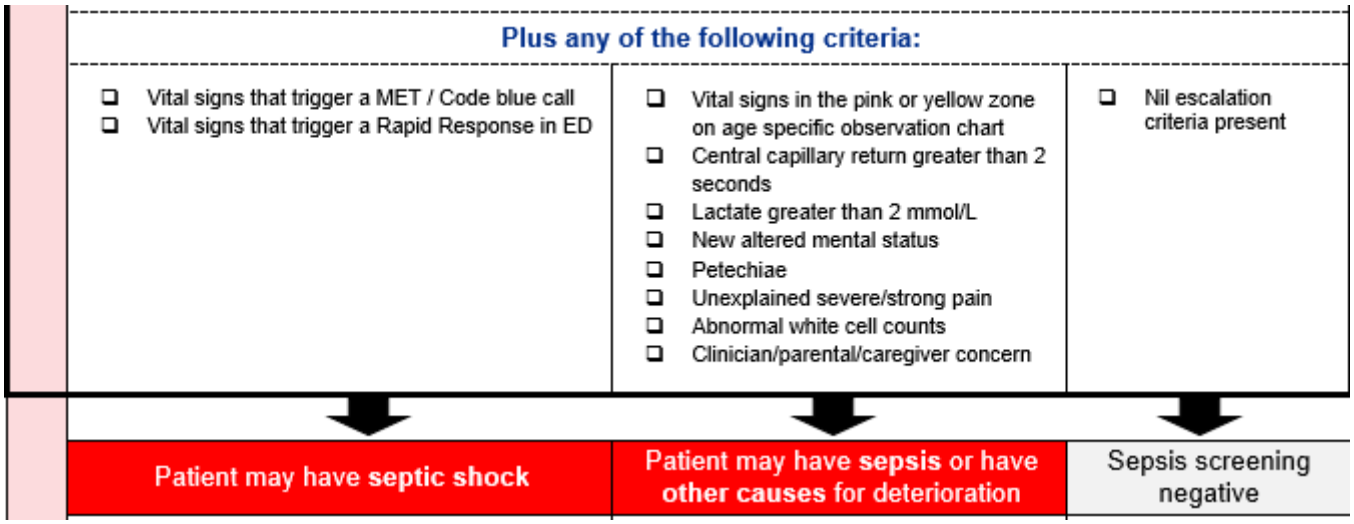
Figure 1: Signs and symptoms of infection



Signs that may suggest septic shock and rapid deterioration

Warm, flushed skin may be present in the early phases of sepsis. As sepsis progresses to shock, the skin may become cool due to redirection of blood flow to core organs. Additional signs of hypoperfusion include tachycardia, altered consciousness, restlessness, and oliguria or anuria.

Figure 2: Physiological indicators of septic shock and sepsis



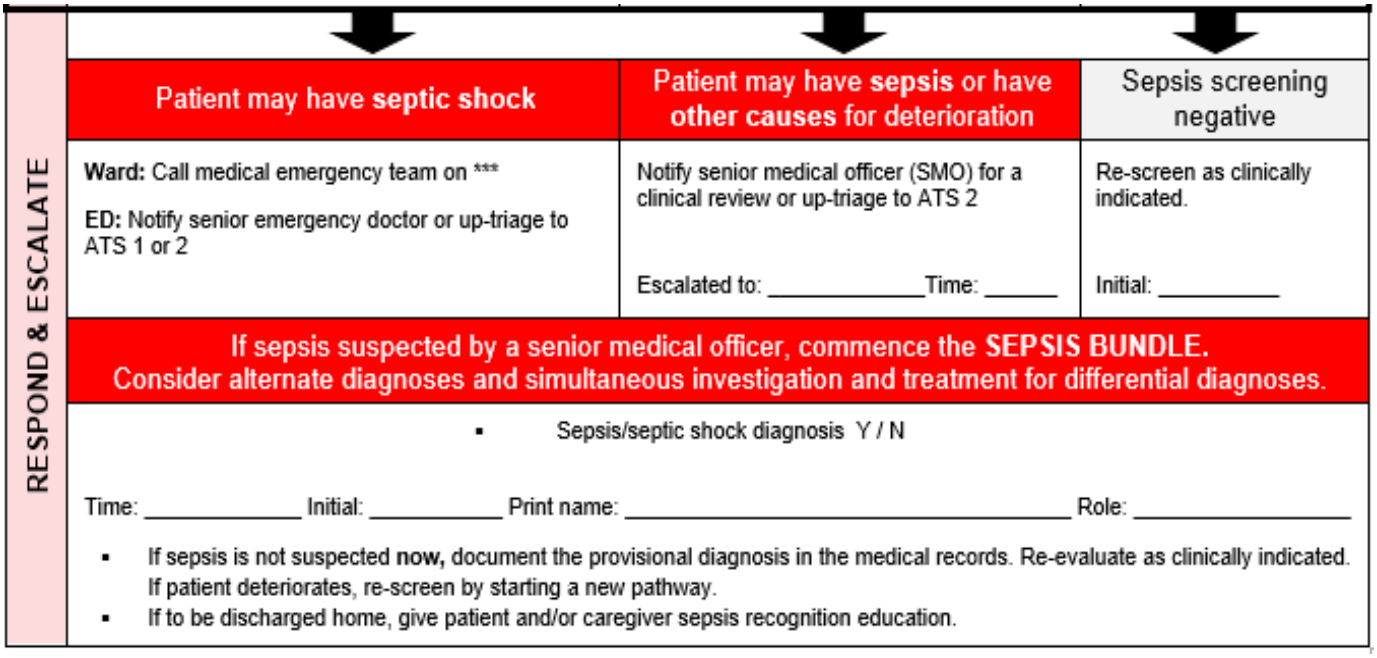
Sepsis response and escalation

Early response to suspected sepsis or septic shock through appropriate escalation to a medical emergency team, senior medical officer or paediatrician is crucial to ensure early initiation of appropriate treatment. The following response and escalation process should occur when patients meet the warning signs of deterioration.

In emergency departments, triage nurses are to use clinical judgement to escalate suspected sepsis by assigning appropriate ATS categories. When there are any concerns, it is a requirement to call for senior medical advice.

If sepsis screening is negative i.e. no escalation criteria is present, re-screen as clinically indicated by starting a new pathway.

Figure 3: Sepsis response and escalation



Sepsis management

Commence sepsis resuscitation bundle

Initial sepsis management consists of undertaking 6 key actions within 60 minutes in the sepsis bundle, including assessment of airway, breathing and circulation as per advanced life support (ALS) principles. This pathway supports the initiation of treatment **as soon as possible** after recognition or strong suspicion and within 60 minutes for both sepsis and septic shock. Evidence suggests that a delay in the first dose of antibiotics beyond 60 minutes of presentation has been associated with increased in-hospital mortality.

Table 1: Sepsis resuscitation bundle

Actions	Details
1. Consider oxygen therapy	• Administer oxygen if appropriate. Maintain saturations 94% and above.
2. Establish intravenous (IV) access	• If IV access is unsuccessful after two attempts, consider gaining access via intraosseous (IO). Do not delay antibiotics.

3. Collect blood cultures and lactate.
Other cultures and investigations as clinically indicated.
Aim to collect cultures prior to antibiotics
	• Paediatric and neonate collections to comprise of one paediatric aerobic bottle inoculated with 1–4 mL of blood (4 mL is optimal). If child has a central venous catheter (CVC) collect blood culture from the CVC.
	• Refer to the Blood Culture Collection Procedure for further details.
	• The risk/benefit ratio favours rapid administration of antimicrobials if it is not logistically possible to obtain cultures promptly.
	• Lactate can be obtained from venous blood gas, point of care testing, or in a fluoride EDTA tube. Lactate is a useful marker of the severity of sepsis and sepsis is more likely to be present if lactate is greater than 2 mmol/L.
	• Other investigations can include:
	  ○ Blood tests: blood glucose level, FBC, CRP, LFT, coagulation studies (PT, APTT), UEC.
	  ○ Other cultures as clinically indicated: sputum, urine (and urinalysis) and wound cultures, joint aspirates, melioid rectal and throat swabs.
	  ○ Other cultures/investigations may include lumbar puncture and other radiology as clinically indicated.

4. Administer intravenous (IV) antibiotics (consider possible source) **(check allergies)**	• Antibiotic regimen is located in the Paediatric Acute Care Sepsis Pathway pages 3 to 6. • If source unknown, use sepsis/septic shock without clear focus (undifferentiated) antibiotic regimen. • If source known, use empirical antibiotic regimen. • Nursing staff should be informed of urgent need to administer antibiotics and they should be administered in order of shortest to longest administration time as outlined in the Australian Injectable Drugs Handbook. • If an abscess, septic arthritis or necrotising fasciitis is suspected, consult relevant surgical doctor for advice and/or review. Note necrotising fasciitis is a surgical emergency.

Actions	Details
5. Assess fluid status and consider fluid resuscitation	• Consider 10 mL/kg of 0.9% Sodium Chloride or balanced solution Plasmalyte/Hartmanns. Reassess and give an additional bolus (10 mL/kg) and repeat as necessary to a maximum total volume of 40 mL/kg. • Refer to *Fluid Management (Paediatrics) RDH Guideline [archived on 17/05/2024]* and Intravenous (IV) Fluids (Paediatric) CAHS Guideline. • If no response, consider inotropes in consultation with paediatrician +/- intensive care doctor. • Consider myocarditis or cardiomyopathy if cold shock with tachycardia, or deterioration with fluid bolus – CXR or echocardiogram may be used to diagnose cardiomegaly. **If vasopressors required,** consider adrenaline 0.05 microg/kg/min to 0.3 microg/kg/min in consultation with paediatrician and intensive care physician.
6. Monitor signs of deterioration and urine output	• Patients with sepsis or septic shock should be closely monitored due to high risk of clinical deterioration. • For the first 2 hours, monitor vital signs every 30 minutes (or more frequently if clinically indicated) and urine output every 60 minutes, until clinically stable from a medical perspective. • If warranted, consider urinary catheter insertion.

Figure 4: Sepsis bundle

SEPSIS BUNDLE: 6 KEY ACTIONS IN 60 MINUTES*
*If patient at risk of febrile neutropenia with septic shock, administer antibiotics within 30 minutes.

Ensure management plan aligns with patient's goals of care.
If there are any clinically indicated variations in care to the pathway, document this in the patient record.

RESUSCITATE

1. Consider oxygen therapy Maintain SpO_2 94% or higher.	▪ SpO_2 maintained	Y / N
2. Establish intravenous (IV) access If unsuccessful, obtain access with intraosseous (IO) or central venous catheter.	▪ Access established	Y / N
3. Collect blood cultures prior to antibiotics (where possible) and a venous blood gas (with lactate) FBC, UEC, LFTs, CRP, blood glucose and coagulation studies. Other investigations as indicated: CXR, urinalysis, urine culture, sputum culture, joint aspirates, wound and melioidosis swabs.	▪ Blood cultures collected ▪ Lactate collected Lactate level: _____ mmol/L	Y / N Y / N
4. Administer IV antibiotics (check allergies) Use correct regimen for age and sepsis severity. If source unknown, use sepsis/septic shock without clear focus regimen (page 3 & 4). If source known, use empirical regimen (page 4 to 6). Ensure nursing staff administer antibiotics immediately. **If surgical source suspected, consult the relevant surgical team.**	▪ 1st antimicrobial commenced ▪ 2nd antimicrobial commenced	Y / N Y / N
5. Assess fluid state and consider fluid resuscitation Use 10mL/kg (0.9% sodium chloride, Hartmann's or Plasma-lyte) bolus. Re-assess and give additional 10mL/kg bolus (maximum of 40mL/kg) as indicated. Consider inotropes early in consultation with paediatrician +/- intensive care physician.	▪ Fluids administered ▪ Inotropes required	Y / N Y / N
6. Monitor signs of deterioration and urine output For the first 2 hours, monitor vital signs every 30 minutes and urine output every 60 minutes. If warranted, insert IDC.	▪ Fluid balance commenced ▪ IDC required	Y / N Y / N

Bundle completed. Time: _____ Initial: _____ Print name: _____ Role: _____

Re-assess and monitor

Close monitoring of observations is recommended for patients with suspected or confirmed sepsis due to high risk of clinical deterioration. This is in accordance with the observation chart/MEWS actions in recognising and responding to clinical deterioration.

Medical officers may request targeted vital signs based on the individual context and this should be clearly documented in the medical records in accordance with the observation chart in recognising and responding to clinical deterioration procedure.

Figure 5: Re-assess and monitor

RE-ASSESS & MONITOR

Re-assess and monitor observations every 30 minutes. Aim for the following:

- Targeted vital signs as per medical consultation
- Lactate less than 2 mmol/L
- Central capillary return under 2 seconds
- Blood glucose greater than 3 mmol/L
- Urine output greater than 0.5mL/kg/hour

Escalate for further medical review if patient meets any of the following: *Tick below which escalation criteria apply.*

- ❑ Central capillary return more than 2 seconds
- ❑ Targeted vital signs are not improving
- ❑ Lactate not trending down
- ❑ Urine output less than 0.5mL/kg/hour
- ❑ New altered mental state
- ❑ Clinician/parental/caregiver concern

If patient deteriorates or fails to improve, re-assess, and refer to higher level of care

- Reconsider diagnosis
- Reconsider treatment
- Consider treatment as a cause of deterioration
- Follow local transfer procedure
- Use ISOBAR to handover to receiving team

Arrange medical review of patients that deteriorate despite initial treatment

Reassess the source of the infection to determine if surgical input is required (e.g. removal of infected device, drainage of an abscess, washout of an infected joint).

Reconsider the diagnosis to confirm the cause for deterioration (e.g. Non-septic cause for presentation).Is treatment a cause of deterioration (e.g. Medication reaction, under/over fluid resuscitation)?

Ensure appropriate antibiotic regimen for the correct source of infection (review if source correct, review cultures and other investigations).

Discuss with senior medical officer/paediatrician and/or consult with other specialists such as paediatric infectious disease, ICU physicians or surgeons as appropriate.

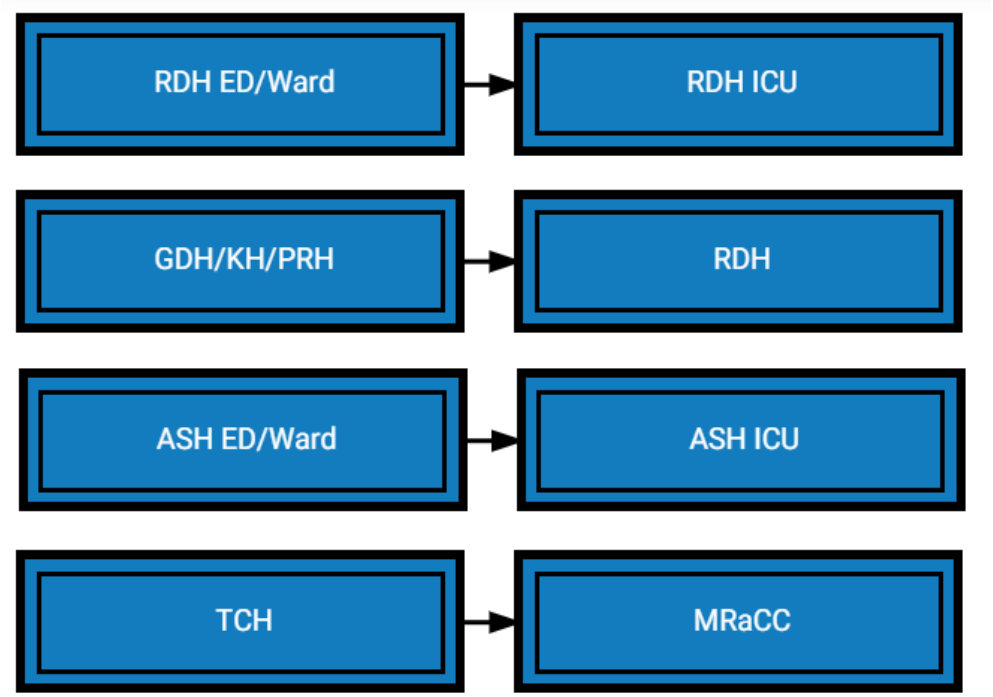
Referral to a higher level of care

Patients diagnosed with sepsis or septic shock are at a high risk of deterioriation in the first 24 to 48 hours. Monitor and escalate care early. Appropriate nursing staff ratios and skills to closely monitor an at risk patient is important.

Patients located at a regional hospital: Palmerston Regional Hospital (PRH), Gove District Hospital (GDH), Katherine Hospital (KH) and Tennant Creek Hospital (TCH), should be transferred to the Royal Darwin Hospital (RDH) or Alice Springs Hospital (ASH) after consultation with all relevant stakeholders.

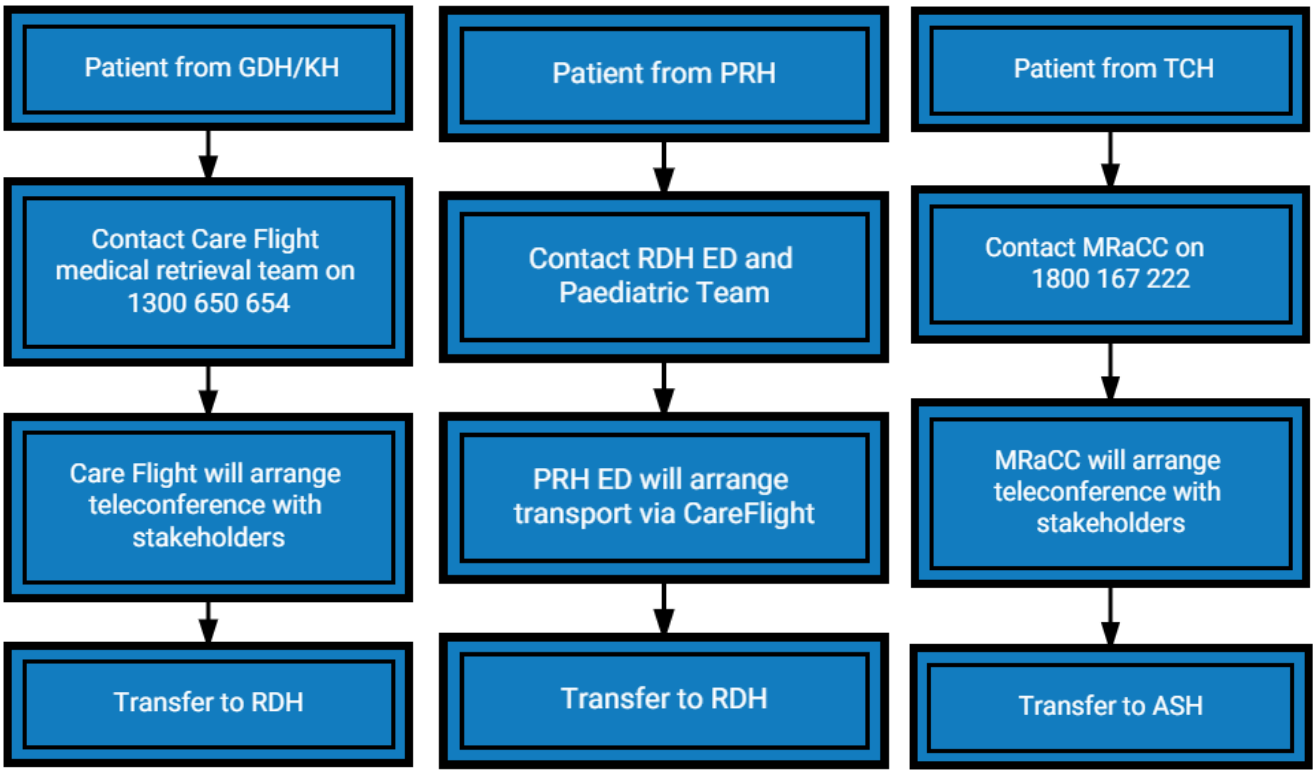
ISOBAR or ISBAR and the sepsis pathway should be used to communicate critical information upon handover to ensure the right information is provided to the receiving team to continue to provide care for the patient.

Figure 6: Referral to higher level of care



- Follow local transfer procedure
- Discuss management plan with patient and/or caregiver
- Use ISOBAR/ISBAR to handover to receiving team

Figure 7: Process of referral for regional hospitals

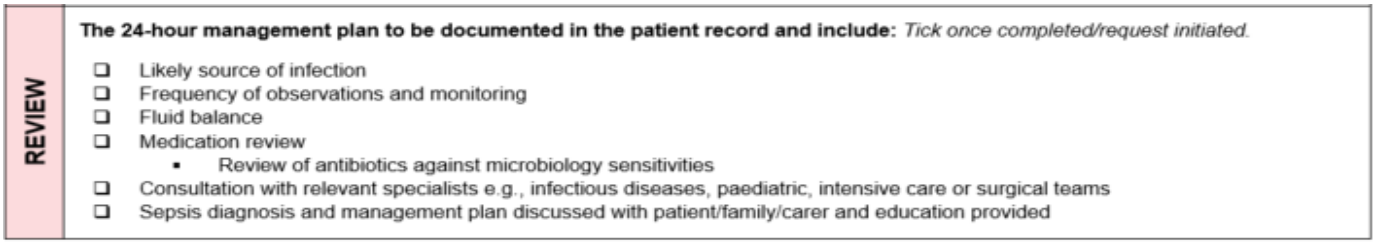


Ongoing management plan

The components of ongoing care of patients with sepsis will vary depending on the source of infection as well as the severity of a patient's illness, underlying illnesses and/or immunosuppression.

Document critical information and the sepsis management plan (see Figure 8) in the patient's medical record to ensure communication of the care plan to clinicians involved in the ongoing care of the patient, including relevant specialists and the multidisciplinary team e.g. AMS and/or ward pharmacists, allied health, interpreters and/or Aboriginal Liaison Officer. The management plan should be communicated at handover and to the senior doctor, nurse team leader and the patient and/or caregiver. Refer if needed to the Clinical Documentation NT Health Policy that outlines the requirements for clinical documentation.

Figure 8: Ongoing management plan



Care planning for discharge from acute care

Sepsis can have long-lasting effects including altered immunological, physiological, psychological and cognitive functioning. Discuss the cognitive, social and emotional wellbeing effects that may occur after diagnosis and treatment for sepsis, including fatigue and anxiety.

Ensure patients understand the importance of discharge medications, optimisation of chronic disease management, and any need for vaccine scheduling.

Ensure follow-up requirements have been discussed with the patient and carers, including the need for rehabilitation, and ensure follow up is reflected in the electronic health record/booking system.

Discharge documentation provided to patient, carers and usual doctor must include:

- A formal diagnosis of sepsis.
- A referral to the usual primary care provider with a plan for any follow-up requirements.
- Details of the senior clinician or care coordinator where appropriate.
- Contact details for follow up requirements such as Allied Health, Outpatients or Community Clinic, emotional and social wellbeing support.

Education requirements

Each service has its own dedicated sepsis teaching programs that includes sepsis pathway awareness in all:

- medical and nursing orientation or induction packages, and
- regular dedicated competency-based sessions throughout the year which includes sepsis simulation.

Completion of the sepsis e-module via MyLearning is recommended prior to attending face-to-face courses, e.g. OPTIMUS.

Monitoring

NT Health quarterly sepsis dashboard (outcome measure) reports and six monthly (process measure) auditing is used to monitor the effectiveness of sepsis pathways in detecting sepsis. Each region is responsible for their own monitoring via Business Intelligence system and/or auditing, reporting and related quality improvements. Monitoring will have oversight by the NT Health Sepsis Standard Committee and NT Health Clinical Goverance Committee.

Accessibility

Sepsis pathways are available via Darwin Stores with a specific HR code:

- Acute care paediatric – CAR/BR – HR543e-02/23
- Acute care paediatric – TER/EAR/BRR – HR543a-02/23

Refer to the staff intranet sepsis site for further information about ordering sepsis pathways and viewing samples of same.

Roles and responsibility

Sepsis patients must have an overarching lead consultant responsible for their care. When multiple teams are involved, communications between teams must be at Consultant level.

AMS teams are responsible for keeping sepsis pathway antibiotic recommendations up to date. A formal review shall be undertaken every six months.

Definitions

The following definition(s) are relevant to this guideline.

Term	Definition
ACSQHC	Australian Commission on Safety and Quality in Health Care.
AMS	Antimicrobial Stewardship – the ongoing effort by a health service organisation to optimise antimicrobial use among patients 'to improve patient outcomes, ensure cost-effective therapy and reduce adverse sequalae of antimicrobial use, including antimicrobial resistance.
ATS	Australasian Triage Scale – A clinical tool used in emergency departments to establish the maximum waiting time for medical assessment and treatment of a patient.
CXR	Chest x-ray.
OPTIMUS	Paediatric recognition and response to the deteriorating patient course.
ICU	Intensive Care Unit – Provides the critical care and life support for acutely ill and injured patients.
MRaCC	Medical Retrieval and Consultation Centre.

Document history

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National Safety and Quality Health Service standards

National Safety and Quality Health Service standards							
Clinical Governance	Partnering with Consumers	Preventing and Controlling Healthcare Associated Infection	Medication Safety	Comprehensive Care	Communicating for Safety	Blood Management	Recognising & Responding to Acute Deterioration
☒	☒	☐	☐	☒	☒	☐	☒