Queensland Paediatric Guideline

Emergency

Sepsis – Recognition and emergency management in children

Purpose

This document provides guidance for all staff involved in the care and management of children presenting to an Emergency Department (ED) with suspected or confirmed sepsis, or septic shock in Queensland.

This guideline has been developed by senior ED clinicians and Paediatricians across the state with specialist input from PICU and Infectious Disease staff, Queensland Children's Hospital, Brisbane and the Queensland Paediatric Sepsis Program (QPSP). It has been endorsed for use across Queensland by the Statewide Emergency Care of Children Working Group in partnership with the Queensland Emergency Department Strategic Advisory Panel and the Healthcare Improvement Unit, Clinical Excellence Queensland.

Key points

- Sepsis is a medical emergency: early recognition and treatment is imperative for survival.
- Consider sepsis in every child with acute illness or new onset of organ dysfunction.
- Certain groups including very young children and children of Aboriginal / Torres Strait Islander / Pacific Islander / Maori origin have a higher risk of sepsis.
- Diagnosis can be difficult; use screening and recognition tools to identify a cohort of children with features of severe illness for immediate senior clinician review.
- Diagnosis is based on clinical judgement supported by laboratory findings.Initial treatment bundle includes collection of blood samples including blood cultures, administration of appropriate antibiotics, rapid fluid resuscitation and early consideration of inotropes; ideally within 60 minutes of presentation.
- Early escalation to paediatric critical care (onsite or via Retrieval Services) Queensland (RSQ)) is essential.

Introduction

Despite advances in prevention and treatment of invasive bacterial infections, sepsis remains a leading cause of childhood morbidity and mortality in Australia.[1] The mortality rate for untreated septic shock is more than 80% and even with treatment is estimated at 15-20% in children.[1-7] Failure to recognise sepsis and the delay in appropriate treatment are common themes in reviews of sepsis related mortality in children.[20] The initial presentation can be vague and non-specific, particularly in neonates, making early diagnosis challenging. International evidence-based guidelines recommend a systematic screening tool to assist in early recognition and management of suspected sepsis or septic shock. In Queensland the Paediatric Sepsis Pathway has a screening and recognition tool that identifies a cohort of children with features of severe illness for early senior clinical review with the question: 'Could this be sepsis"? Clinician gestalt or the role of expert involvement is key in early recognition.

Once sepsis is recognised, initial treatment includes the administration of appropriate antibiotics for the presumed source of infection, rapid fluid resuscitation and early consideration of inotropic support of the circulation; as soon as possible and at least within within 60 minutes of presentation.8 Early paediatric critical care escalation and involvement (onsite or via Retrieval Services Queensland (RSQ)) is essential). Sepsis is a medical emergency [8-10]

Definitions

Paediatric sepsis is defined as 'life threatening organ dysfunction resulting from a dysregulated host response to infection .10 It is a syndrome shaped by pathogen host, timing, environmental, as well as healthcare system factors.11-12 The most common type of pathogens are bacteria but viruses and fungal infections can also result in sepsis),

Septic shock is a subset of sepsis in which profound circulatory, cellular, and metabolic dysfunction associated with a greater risk of mortality.[14] It is identified as sepsis with cardiovascular organ dysfunction, acknowledging that hypotension is a late and often pre-terminal sign in children.[10]

Toxic shock syndrome is a potentially life-threatening subset of paediatric sepsis, caused by superantigens from toxin-producing strains of *Staphylococcus aureus* or *Streptococcal pyogenes*.[17]

Assessment

Diagnosis

Early recognition of sepsis and prompt treatment is necessary to avoid further organ failure, deterioration and death.[13] Consider sepsis in any child with an acute illness, or in any high-risk group (see box below), and initiate screening using the Queensland Paediatric Sepsis Pathway (Link or in appendices below). It is important to record a complete set of vital sign observations including blood pressure. The QPSP recognition tool supports clinicians to identify children with features of severe illness for early senior review with the question 'could this be sepsis'?

A diagnosis of sepsis is made using clinical judgement, supported by laboratory testing. There is no single clinical finding or test that is diagnostic. A careful history and clinical examination paying attention to parental concerns may assist to reveal red flags. If sepsis is suspected, initiate investigations and treatment via the Queensland Paediatric Sepsis Pathway until sepsis can be excluded and therefore

Children with high risk for sepsis

- neonates and premature infants
- children of Aboriginal / Torres Strait Islander / Pacific Islander / Maori origin
- Immunocompromised patients:
  - unimmunised or incomplete immunisation status
  - malignancy and/or chemotherapy
  - immune deficiency
  - asplenia (surgical or functional e.g. sickle cell disease)
  - long-term steroid use
  - immunosuppressant drug therapy
- recent surgical procedure (within 6 weeks)
- intravenous recreational drug use
- indwelling lines or catheters (e.g. VP shunt or CVAD)
- Recent inpatient episode of sepsis (within 6-12 weeks)

treatment de-escalated. Validated triage tools for early stages of paediatric sepsis based on vital signs are difficult to develop. Therefore, the emphasis is on senior medical review of the patient.,.[15]

Sepsis presentation varies with age. Infants and neonates commonly present with non-specific symptoms and signs, such as feeding difficulties and/or apnoea. Older children may present with a source of infection and/or a constellation of features including fever or hypothermia, vomiting, inappropriate and persistent tachycardia, altered mental state and reduced peripheral perfusion. Pain without an identified source can be a non-specific sign in children.[13,15] Severe presentations can include seizures. Some infections present with a concerning purpuric rash. Deviations from pre-existing trends in vital signs (see table below) can be a red flag. The Paediatric sepsis pathway features of severe illness refer to the CEWT scores for the system examined e.g. the respiratory rate or heart rate; NOT the overall CEWT score which can be misleading. Vital sign features of severe illness include:

- altered mental state
- severe tachypnoea, increased work of breathing, grunt, weak cry or apnoea
- marked and persistent tachycardia (including high normal in the absence of drivers i.e. fever, pain)
- hypotension
- poor skin perfusion
- indicators of moderate to severe dehydration

It is important to pay attention to concerns expressed by the caregiver, particularly changes in usual behaviour of the child.

Normal range for vital signs by age based on Childhood Early Warning Tool (CEWT)			
Age	**Heart Rate (bpm)**	**Minimum Systolic BP (mmHg)**	**Respiratory Rate (bpm)**
< 1 year old	100-159	<75	21-45
1-4 year old	90-139	<80	16-35
5-11 year old	80-129	<85	16-30
12-17 year old	60-119	<90	16-25

Laboratory sign features of severe illness include:

- lactate > 2 concerning, > 4
- glucose < 3 (note can be high with stress)
- low platelets
- elevated Creatinine
- elevated INR
- elevated bilirubin or ALT

Septic Shock

Septic shock is the progression of sepsis and can vary in presentation, oscillating from a child who is vasodilated with bounding pulses to a child who is cold and mottled [16] (see table below). Children with septic shock may have normal blood pressure. The way in which the child presents does not change management nor determine type of inotropic support.

ALERT – Hypotension is a late, and often terminal, sign in paediatric septic shock.

Initiate treatment via the Queensland Paediatric Sepsis Pathway and immediately contact paediatric critical care (onsite or via RSQ) for child in septic shock

Paediatric septic shock presentations	
Shock with vasoconstriction	**Shock with vasodilation**
• Distributive shock with capillary leak, vasoconstriction and relative myocardial depression • common in infants and young children • Constricted peripheral systemic vasculature: cold peripheries and prolonged capillary refill time • Tachycardia is usually present; relative bradycardia is a pre-terminal sign • Blood pressure can be maintained until late	• Distributive shock with vasoplegia, capillary leak and often, preservation of cardiac function. • More common in older children (and adults) • Characterised by vasoplegia, in which the systemic vascular resistance is low with low diastolic blood pressure: brisk capillary refill time ('flash' capillary refill) and pulses are usually felt to be full or bounding • Tachycardia is usually present: relative bradycardia is a pre-terminal sign • Pulse pressure is high, often due to a low diastolic blood pressure • Progression to low cardiac output can occur anytime

Clinical findings consistent with insufficient end-organ perfusion:

- **Mental status:** progressive lethargy, drowsiness or obtundation. Alternatively, restlessness and/or agitation are often seen and can be mistaken for "a vigorous child" but reflects compromised cerebral perfusion due to shock. Infants tend to have irritability and/or apnoeas. Parental concern for a change in behaviour can be an early warning sign.
- **Skin:** temperature gradient from core to extremities (note that either hyperthermia or hypothermia can be present), mottled colour, prolonged capillary refill time (more than 2 seconds but note that brisk capillary refill time can be seen), petechial or purpuric rash. Purpura fulminans is a widespread non-blanching purpuric rash classically seen in meningococcaemia but may also be associated with severe sepsis from *Pneumococcus*. A generalised erythematous rash is seen in toxic shock.
- **Cardiovascular:** tachycardia is usually one of the earliest signs. Mean arterial pressure (MAP) can be maintained and the pulse pressure typically is narrow (vasoconstriction to maintain MAP) but may be high (vasodilation). There may be evidence of cardiac failure (hepatomegaly, gallop rhythm and jugular venous distension) with myocardial depression. A classic pitfall in the recognition of shock is attributing difficulty in obtaining peripheral oxygen saturations and non-invasive blood pressure due to technical issues rather than recognising the presence of hypotension/hypoperfusion. Point of care testing of lactate andmonitoring the trends in response to therapy (if abnormal) is also an important measure.
- **Respiratory:** rate is increased to compensate for metabolic acidosis including lactic acidosis (Kussmaul breathing) or if the respiratory system maybe the primary source of infection. Acute respiratory distress syndrome (ARDS) may develop with progressive worsening of respiratory distress (tachypnoea, increased work of breathing), hypoxia and focal chest signs (reduced breath sounds, inspiratory crepitations,).

- **Renal:** reduced urine output.

Toxic Shock Syndrome

Toxic shock syndrome is a potentially life-threatening subset of paediatric sepsis, caused by superantigens from toxin-producing strains of *Staphylococcus aureus* or *Streptococcal pyogenes*.[17] Symptoms may include high fever, vomiting, diarrhoea, myalgia, confusion, collapse and usually a widespread erythematous rash. It can occur in any patient. It is important to distinguish this entity as treatment requires the addition of further antibiotics (see AMS) and possibly IV immunoglobulin for their antitoxin properties.

Investigations

No single laboratory test will confirm or exclude sepsis. There is currently no evidence to support the use of a specific biomarker to diagnose sepsis.[13] High lactate levels 4) have been associated with increased mortality, PICU admission and hospital length of stay. A lactate that is > 2 is potentially concerning but a lactate > 4 requires urgent action. Lactate may be a useful biomarker when monitoring response to treatment.

Clinical findings and host factors should direct specific microbiological sampling. However, despite adequate microbiological sampling, in some children with sepsis, the pathogen is not identified and this does not exclude sepsis (culture-negative sepsis).[18]

ALERT – In septic shock, do not delay antibiotic administration for specimen collection or testing beyond ONE hour.

Investigations in paediatric sepsis	
Investigation type	**Findings in paediatric sepsis**
Blood culture	**Prioritise over other blood tests. Ideally, blood sample should be collected prior to antibiotics but not delay treatment for collection.** Culture sensitivity increases with blood volume. Recommended volume for aerobic culture in yellow top bottle: • Aiming 2-6 mL, ideally 4 mL • for neonates, 1 mL is the minimum Collection of anaerobic blood culture is not needed. If the child has a CVAD, blood cultures should be taken from each lumen as per protocol.
Blood gas (usually venous in ED setting)	Markers of possible sepsis: • base deficit more than 5.0 mEq/L • lactate more than 2.0 mmol/L Do **NOT** attribute increased lactate to difficult venepuncture. Glucose < 3 mmol/L associated with glycogen depletion and a high Glucose can be part of a stress response (and not necessarily an indication of diabetes).
Full blood count	WCC can be normal, high or low in early sepsis.

	Platelet count <100,000 uL in sepsis or disseminated intravascular coagulation (DIC)[10].
Coagulation studies	Derangement in the context of sepsis with thrombocytopaenia indicative of DIC.
C reactive protein	More readily available, but less specific than procalcitonin. Low value does not exclude early sepsis.
Electrolytes and creatinine	Often deranged, raised creatinine in sepsis related renal failure.
Liver function tests	Increased bilirubin or alanine aminotransferase (ALT).
Urine sample	Collection may not be possible until after fluid resuscitation due to intravascular depletion.
Lumbar puncture	Not indicated in the initial work up and contraindicated in established sepsis until hemodynamically stable. Once stable, only perform in alert child with no signs of raised ICP, coagulopathy or haemodynamic compromise. Can do WCC and PCR for meningitis diagnosis on CSF from delayed LP.
Radiography	Consider CXR for respiratory distress or signs on examination. Other imaging as directed by the focus of infection e.g. septic joint.

Management

Refer to the flowchart in Appendix 1 for a summary of the recommended emergency management of sepsis. Refer to QPSP for the sepsis pathway.

Early aggressive treatment should ensue once sepsis is suspected, with the aim of decreasing tachycardia, improving peripheral perfusion and restoring a normal level of consciousness. Children must be closely monitored for response to therapy.

In septic shock, antimicrobials should be administered as soon as possible within 1 hour of recognition. In shock, delayed time to antimicrobial administration beyond 1 hour has been associated with an increased mortality. In sepsis without shock, antimicrobials should still be administered as soon as possible, suggested within up to 3 hours of recognition.

CREDD (Children's Resuscitation Emergency Drug Dosages) provides weight-based medication and equipment for managing these critically unwell children

Seek senior emergency/paediatric advice as per local practice if sepsis is suspected

Seek urgent paediatric critical care advice (onsite or via RSQ) for a septic child with insufficient response to fluids or needing inotropes or intubation (see box with triggers for escalation)

Interventions within the first 60 minutes:

- Inform senior clinicians.
- Deliver supplemental oxygen and respiratory support with an appropriate device.
- Obtain immediate intravenous or intraosseous access and send bloods.
  Cconsider umbilical line access in newborns up to 2 weeks of life.
- Initial bloods should include blood cultures, venous blood gas with lactate and glucose.
- Obtain further bloods if possible, including full blood count, Creactive protein, biochemistry and coagulation profile.
- Urgently administer broad-spectrum antibiotics IV or IO as per QPSP antibiotic guidance
- - if no IV or IO access within 60 minutes, administer Ceftriaxone 50mg/kg IM (maximum 2 grams) and seek assistance.
    - IM dosing of antibiotics often fails to deliver adequate coverage due to poor perfusion and so should only be used when other methods have failed.
- Once IV access is obtained, complete source specific empiric antibiotic doses (see antibiotic guidelines on Queensand Paediatric Sepsis Pathway and antibiotic dosing for neonates).

- Provide immediate fluid resuscitation starting with 10-20 mL/kg of balanced solution (like Plasmalyte) or sodium chloride 0.9% (normal saline) to be pushed in less than five minutes using 50 mL syringe with a staff member dedicated to pushing fluids. The goal to restore normal circulating volume and physiological parameters.
- Titrate to response: decrease in heart rate and the improvement of end-organ perfusion. Repeat as necessary, evaluating for signs of fluid overload.
- Commence inotropic support of Adrenaline (as first line) if normal physiological parameters are not restored after giving more than 40-60 mL/kg of fluids or anytime if hypotension is present.

- Echocardiography can guide fluid administration and commencement of inotropes.

Triggers notify consultant and escalate to paediatric critical care (onsite or via RSQ) if the patient still has:

- Hypotension (Blood pressure CEWT score 2 or more)
- Reduced level of consciousness despite resuscitation
- Lactate 2mmol/L or greater or not reducing
- Persistent tachycardia (Heart rate CEWT score 2 or more)
- Persistent tachypnoea (Respiratory CEWT score 2 or more)

Ongoing care

Airway and Breathing

- Give high concentration supplemental oxygen.
- Initial delivery can be via anon-rebreather mask with escalation as required.
- Maintain the patient's airway with positioning and airway adjuncts.
- Consider high-flow nasal cannulae as an alternative transitory support in awake and responsive patients.
- Give PEEP through a T-piece (anaesthetic) bag while preparing for intubation for children that are grunting, obtunded, or hypoxic despite supplemental oxygen.

- Consider inserting a nasogastric tube for gastric distension, which can otherwise impede ventilation.
- Early intubation may be required for additional respiratory support, airway protection in a child with reduced conscious state, and children in shock (to facilitate the insertion of lines, and support of cardiac function). Refer to the Management of Paediatric Septic Shock Guideline (access via QH intranet).

ALERT – Child may arrest from cardiovascular collapse on RSI /intubation
Avoid drugs with negative inotropy (such as Midazolam or Propofol) and have arrest dose of Adrenaline IV ready. Avoid pure alpha agonists such as metaraminol as myocardial depression can be significant.

- Adequately pre-oxygenate child and have haemodynamics optimised with concomitant fluid resuscitation and Adrenaline infusion prior to intubation.
- Reduce the induction drug dose in a child with significant cardiovascular compromise (i.e. 50% of weight-based dose).
- Ketamine (0.5-1mg/kg)and/or Fentanyl (1-2 microgram/kg) for induction (less cardiodepressant) and Rocuronium (1.2 mg/kg) for muscle relaxation are generally a suitable combination for rapid sequence induction.

Circulation

Profound fluid loss from the intravascular space occurs due to capillary leak from the systemic inflammatory response. Fluid resuscitation and inotropic support is aimed at restoring normal physiological parameters, particularly heart rate and blood pressure.[21]

Fluids for rapid infusion

Recommended:
- Sodium chloride 0.9% (normal saline)
- Hartmanns solution or plasmolyte

Hypotonic fluids should **never** be used as bolus therapy**.**

- Administer fluids as a rapid bolus (10-20 mL/kg) and repeat as necessary being mindful of the development of fluid overload (inspiratory crepitations, hepatomegaly, and/or gallop rhythm).
- Consider inotropes in fluid-refractory shock, to be started within 60 minutes of presentation (has been shown to improve outcomes).[22-23]
    - First-line choice: Adrenaline starting at 0.1 microgram/kg/min (dosing > 0.5microgram/kg/min is concerning and should be done only in conjunction with PICU/RSQ), which can be administered temporarily via a peripheral IV or IO line before central access is gained in a suitable environment.
    - Second-line choice: Noradrenaline starting at 0.1 micrograms/kg/min

Aliquots of Adrenaline IV (Push dose pressors) can be given as 1 microgram/kg (i.e. 0.1 mL/kg of a 1:100,000 Adrenaline solution) if infusion is being prepared and the patient remains in shock. See CREDD.

Other considerations

- For those with suspected adrenal insufficiency, if possible, collect blood for cortisol and ACTH and then administer Hydrocortisone IV (1 mg/kg).[8,25] Consider for fluid and catecholamine resistant shock particularly if the patient has hypoglycaemia (limited data on efficacy).

- Consider alternative diagnoses in all patients, especially neonates who may have a metabolic or cardiogenic (congenital duct dependent lesions or acquired cardiac failure e.g. myocarditis) cause of their shock
- Electrolyte disturbance (e.g. hypocalcaemia) is common in critically-ill children with sepsis and can contribute to poor cardiac function. Replacement should be in accordance with local guidelines.

Escalation and advice outside of ED

Clinicians can contact the services below to escalate the care of a paediatric patient as per local practices and in conjunction to the Queensland Paediatric Sepsis Pathway. Transfer is recommended if the child requires care beyond the level of comfort of the treating hospital.

Child is critically unwell or rapidly deteriorating

Includes the following children with sepsis or suspected sepsis (as a guide):

- hypotension (Blood pressure CEWT score 2 or more)
- reduced level of consciousness despite resuscitation
- lactate 2mmol/L or greater or not reducing
- persistent tachycardia (Heart rate CEWT score 2 or more)
- persistent tachypnoea (Respiratory CEWT score 2 or more)
- physiological triggers based on age (see below)

Less than 1 year	1-4 years	5-11 years	Over 12 years
• RR >50 • HR <90 or >170 • sBP <65 • SpO2 <93% in oxygen or <85% in air • GCS ≤12	• RR >40 • HR <80 or >160 • sBP <70 • SpO2 <93% in oxygen or <85% in air • GCS ≤12	• RR >40 • HR <70 or >150 • sBP <75 • SpO2 <93% in oxygen or <85% in air • GCS ≤12	• RR >30 • HR <50 or >130 • sBP <85 • SpO2 <93% in oxygen or <85% in air • GCS ≤12

Reason for contact	Who to contact
For immediate onsite assistance including airway management	The most senior resources available onsite at the time as per local practices. Options may include: • paediatric critical care • critical care • anaesthetics • paediatrics • Senior Medical Officer (or similar)
Paediatric critical care advice and assistance	Onsite or via Retrieval Services Queensland (RSQ). If no onsite paediatric critical care service contact RSQ on **1300 799 127**: • for access to paediatric critical care telephone advice • to coordinate the retrieval of a critically unwell child

	RSQ (access via QH intranet) **Notify early of child potentially requiring transfer.** **Consider early involvement of local paediatric/critical care service.** In the event of retrieval, inform your local paediatric service.

Related documents

Guidelines

- QPSP Sepsis Guidelines and Tools
- Febrile illness
- Management of Paediatric Septic Shock
- Management of Fever in a Paediatric Oncology Patient

Resources

- Sepsis resources for families

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Guideline approval

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Disclaimer

This guideline is intended as a guide and provided for information purposes only. The information has been prepared using a multidisciplinary approach with reference to the best information and evidence available at the time of preparation. No assurance is given that the information is entirely complete, current, or accurate in every respect. We recommend hospitals follow their usual practice for endorsement locally including presenting it to their local Medicines Advisory Committee (or equivalent) prior to use.

The guideline is not a substitute for clinical judgement, knowledge and expertise, or medical advice. Variation from the guideline, taking into account individual circumstances may be appropriate.

This guideline does not address all elements of standard practice and accepts that individual clinicians are responsible for:

- Providing care within the context of locally available resources, expertise, and scope of practice
- Supporting consumer rights and informed decision making in partnership with healthcare practitioners including the right to decline intervention or ongoing management
- Advising consumers of their choices in an environment that is culturally appropriate and which enables comfortable and confidential discussion. This includes the use of interpreter services where necessary
- Ensuring informed consent is obtained prior to delivering care
- Meeting all legislative requirements and professional standards
- Applying standard precautions, and additional precautions as necessary, when delivering care
- Documenting all care in accordance with mandatory and local requirements

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0 minutes

Recognition

- Fever greater than 38.5°C or hypothermia
- Looks sick or toxic **(Box A)**
- Irritable or drowsy
- Poor perfusion/purpura/petechiae
- Close attention to vital signs and risk factors **(Box B)**

First 5 minutes

Immediate actions

- Attach cardiorespiratory monitoring
- Assess airway and administer oxygen
- Initial assessment

First 15 minutes

Establish vascular access

- Insert IO if two attempts at IV fail
- Consider UVC in neonate under 2 weeks of life
- Take bloods:
  - BC, VBG with lactate and glucose (priority)
  - FBC, CRP, UEC, LFT, +/- Coags, +/- Grp and hold
- Administer antibiotics IV **(Box C)**
  - Ceftriaxone IM 50 mg/kg (max 2 g) if delayed
  - Give full dose/s of antibiotic/s IV once access established

First 30 minutes

IV fluid administration with Sodium Chloride 0.9%

- 20 mL/kg bolus over ~ 5 min
- Repeat 20 mL/kg boluses to a maximum of 40-60 mL/kg within first hour
- Each time reassess response
- Aim: improved HR, mentation, perfusion
- Overload: hepatomegaly, crepitations
- Prepare Adrenaline – both infusion and 1:100,000 solution for aliquot doses

First 60 minutes

Inotropes & further considerations

- Seek Paediatric Critical Care input as per **Box D**
- Adrenaline infusion:
  1 mL 1:1,000 with 49 mL Glucose 5%, commence 0.05-0.5 microgram/kg/min (can be initially low dose via peripheral IV)
- If delay in infusion: Adrenaline bolus 0.1 mL/kg of 1:100,000 (1 microgram/kg)
- Consider further IV fluid boluses
- Consider early intubation **(Box E)**
- Correct hypoglycaemia (2 mL/kg Glucose 10%)/ hypocalcaemia
- Consider Hydrocortisone IV 1 mg/kg (max 50mg)

Discuss ECMO in refractory shock with PICU

Seek urgent senior emergency/paediatric advice as per local practice

Contact Retrieval Services Queensland (RSQ) on 1300 799 127 if no Paediatric Critical Care facility onsite

Box A: Toxic features

- Altered mental state
- Tachypnoea, increased WOB, grunt, weak cry
- Marked/persistent tachycardia
- Moderate to severe dehydration
- Seizures

Box B: Risk factors for sepsis

- Age less than 3 months
- Indwelling medical device
- Aboriginal/Torres Strait Islander/Pacific Islander/Maori
- Immunocompromised/asplenia/neutropaenia/incomplete immunisation
- Recent trauma or surgery/invasive procedure/wound within 6 weeks
- Chronic disease or congenital disorder

Box C: Initial antibiotic doses

Age less than 2 months

Sepsis where meningitis possible or bacterial meningitis:
Ampicillin/Amoxycillin IV 50 mg/kg
PLUS Cefotaxime IV 50 mg/kg

Sepsis (source unknown but bacterial meningitis excluded):
Ampicillin/Amoxycillin IV 50 mg/kg
PLUS Gentamicin IV:
Birth to 1 month: 5 mg/kg
1 to 2 months: 7.5 mg/kg

Age greater than 2 months

Sepsis with or without bacterial meningitis:
Cefotaxime IV 50 mg/kg (maximum 2 g)
OR Ceftriaxone IV 100 mg/kg (maximum 4 g)

If documented cephalosporin anaphylaxis:
Ciprofloxacin IV 10 mg/kg (maximum 400 mg)
PLUS Vancomycin IV 15 mg/kg (maximum 750 mg)

If septic shock requiring inotropes:
Cefotaxime IV 50 mg/kg (max 2 g) (OR Ceftriaxone IV 100 mg/kg (max 4 g))
PLUS Vancomycin IV 15 mg/kg (maximum 750 mg)
PLUS Gentamicin IV
1 month to 10 years of age: 7.5 mg/kg (maximum 560 mg)
More than 10 years of age: 7 mg/kg (maximum 640 mg)

If risk factors for nmMRSA:
ADD Lincomycin IV 15 mg/kg (maximum 1.2 g)

If risk factors for multi-resistant MRSA:
ADD Vancomycin IV 15 mg/kg (maximum 750 mg)

Consult CHQ Antibiocard for ongoing doses. Review and rationalise antimicrobial therapy based on clinical condition and microbiology results.

Box D: Triggers for escalation to Paediatric Critical Care

- No improvement after 40 mL/kg fluid administration
- Inotropes
- Reduced level of consciousness
- Hypotension
- Lactate > 4 mmol/L

Box E: Intubation/RSI

- Potential for deterioration/cardiac arrest
- Prepare Adrenaline bolus dose 1mL of 1:10,000 made up to 10 mL with Sodium Chloride 0.9% at dose 0.1 mL/kg
- Use RSI drugs to optimise physiology
- Ketamine IV 0.5 – 1 mg/kg
- +/- Fentanyl IV 1 – 2 microgram/kg
- Rocuronium IV 1.2 mg/kg

Abbreviations

IO = Intra Osseous
UVC = Umbilical Venous Catheter
BC = Blood Culture
VBG = Venous Blood Gas
FBC = Full Blood Count
CRP = C Reactive Protein
UEC = Urea, Electrolytes & Creatinine
LFT = Liver Function Tests
IV = Intravenous
HR = Heart Rate
WOB = Work of Breathing
RSI = Rapid Sequence Induction

CHQ Antibiocard: www.childrens.health.qld.gov.au/health-professionals/ams-aim-gdl/

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