GUIDELINE

Sepsis and Bacteraemia: Neonatal and Paediatric

Scope (Staff):	Medical, Nursing, Pharmacy
Scope (Area):	Perth Children's Hospital (PCH) & Neonatology

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this disclaimer

- These guidelines provide recommendation for up front empiric antibiotic choice only – they have not been developed for progressive sepsis despite empiric treatment. In children with progressive sepsis or severely unwell with sepsis despite appropriate initial empiric antibiotic therapy, reassess and reconsider source of infection, differential diagnoses and discuss broadening antimicrobial therapy with an Infectious Diseases Physician.
- In patients with suspected sepsis, antimicrobial therapy should be given as soon as possible, ideally within 15 minutes of sepsis recognition. Cultures must be collected but if specimen collection is delayed for any reason, do not delay antimicrobial adminstration
- Empirical regimens are intended for initial therapy (up to 48 hours only).Therapy should be modified as soon as additional microbiological and clinical information is available.
- Empiric regimens do not cater for children at increased risk of antimicrobial resistance. Modification to empiric recommendations may be required in specific circumstances (see footnote a).
- Empiric antibiotics are listed below in the order they should be administered. The administration of benzylpenicillin, ceftriaxone, cefotaxime, cefepime or gentamicin should be prioritised due to the short administration time and rapid bactericidal action above vancomycin which has a longer infusion time.
- Read this guideline in conjunction with the CAHS Sepsis Recognition and Management and Neonatal Sepsis guidelines
- **Refer to the separate ChAMP guidelines for children with presumed Meningitis and Meningoencephalitis or Fever in the Oncology patient (or non-oncology neutropenia) Guideline**

<table>
<tr><th colspan="2" rowspan="2">CLINICAL SCENARIO</th><th>DRUGS/DOSES</th></tr>
<tr><th>Standard Protocol [a]</th></tr>
<tr><td colspan="3">Sepsis in the neonate:
For neonates with suspected sepsis in the NICU refer to: Sepsis Neonatal guideline
Refer to: Microbiological Diagnostic Testing for Infections in Neonates Guideline for additional information regarding testing for key infections in neonates (e.g. Syphilis or Cytomegalovirus).
These guidelines are not designed for children with progressive sepsis despite empiric treatment. In children with progressive sepsis or severely unwell with sepsis despite appropriate initial empiric antibiotic therapy, reassess and reconsider source of infection, differential diagnoses and discuss broadening antimicrobial therapy with an Infectious Diseases Physician.
Drug allergy[b] is extremely rare in neonates – contact Infectious Diseases in cases of confirmed allergy</td></tr>
<tr><td>Early-onset neonatal sepsis (EOS)</td><td>Community OR health-care associated Early Onset Sepsis[c]

(<3 days of age)</td><td>IV gentamicin[e] (doses as per neonatal guidelines)
AND
IV benzylpenicillin (doses as per neonatal guidelines)</td></tr>
<tr><td rowspan="3">Late-onset neonatal sepsis (LOS) – Community</td><td>Community associated Late onset Sepsis[c]

Neonatal fever without source OR suspected neonatal sepsis NOT severely unwell

(≥ 3 days to <4 weeks postnatal age)</td><td>IV gentamicin[e] (doses as per neonatal guidelines)
AND
IV benzylpenicillin (doses as per neonatal guidelines)
AND CONSIDER
HSV testing and consider IV aciclovir (doses as per neonatal guidelines) [d]</td></tr>
<tr><td rowspan="2">Community associated Late onset Sepsis[c]

Neonatal septic shock or severely unwell with sepsis*
OR
Confirmed or suspected neonatal meningitis

(≥ 3 days to <4 weeks postnatal age)</td><td>IV cefotaxime (doses as per neonatal guidelines)
AND
IV benzylpenicillin (doses as per neonatal guidelines)
AND CONSIDER
HSV testing and consider IV aciclovir (doses as per neonatal guidelines) [d]</td></tr>
<tr><td>Do not delay antibiotic administration in severely unwell children if microbiological sample collection is delayed or unsuccessful.

*Severely unwell with sepsis can be defined as any of the following:
evidence of end-organ dysfunction or elevated lactate
apnoeas or airway compromise requiring airway management;
respiratory failure or need for invasive/ non-invasive respiratory support;
shock or need for circulatory support fluid bolus/inotropes;
reduced conscious state;
coagulopathy;
need for intensive care input or admission; or
senior clinician concern that the child is “severely unwell”.</td></tr>
</table>

CLINICAL SCENARIO		DRUGS/DOSES Standard Protocol [a]
Late-onset neonatal sepsis (LOS) – Health-care associated	**Healthcare associated *Late Onset Sepsis*[c]** Healthcare-Associated Neonatal Sepsis i.e. presumed serious bacterial infection with unknown source **(≥ 3 days to <4 weeks postnatal age)**	IV gentamicin[e] (doses as per neonatal guidelines) **AND** IV vancomycin (doses as per neonatal guidelines)
		Do not delay antibiotic administration in severely unwell children if microbiological sample collection is delayed or unsuccessful. Healthcare-Associated sepsis can be defined as a patient with any of the following: • Presumed sepsis in a neonate with a central venous cathether in place for more than 48 hours. • Neonate hospitalised from birth, for more than 72 hours • Recent surgery

CLINICAL SCENARIO	DRUGS/DOSES			
	Standard Protocol	Known or Suspected MRSA[a]	Low risk Penicillin allergy[b]	High risk Penicillin allergy[b]
Community acquired sepsis or septic shock **(≥4 weeks postnatal age)**	IV ceftriaxone 50 mg/kg/dose (to a maximum of 2 grams) 12 hourly **IF SHOCKED, ADD** IV gentamicin[e] (refer to monograph for dose) **AND** IV vancomycin 15 mg/kg/dose (to a maximum of 750 mg) 6 hourly	As per standard protocol		Discuss with Infectious Diseases
	For ongoing treatment, discuss with Infectious diseases			
Healthcare-Associated Sepsis i.e. presumed serious bacterial infection with unknown source **(≥4 weeks postnatal age)** Includes community acquired sepsis with a central venous access device (CVAD) in place	IV cefepime 50 mg/kg/dose (to a maximum of 2 grams) 8 hourly **AND** IV vancomycin 15 mg/kg/dose (max initial dose of 750 mg) 6 hourly **IF SHOCKED, ADD** IV gentamicin[e] (refer to monograph for dose)	As per standard protocol		Discuss with Infectious Diseases
	For ongoing treatment, discuss with Infectious diseases			

<table>
<tr><th rowspan="2">CLINICAL SCENARIO</th><th colspan="4">DRUGS/DOSES</th></tr>
<tr><th>Standard Protocol</th><th>Known or Suspected MRSA[a]</th><th>Low risk Penicillin allergy[b]</th><th>High risk Penicillin allergy[b]</th></tr>
<tr><td rowspan="2">Fever > 38°C without a source and with no haemodynamic instability and suspicion of bacteraemia as determined by a senior clinician (≥4 weeks postnatal age)</td><td>IV ceftriaxone 50 mg/kg/dose (to a maximum of 2 grams) 24 hourly</td><td colspan="2">As per standard protocol</td><td>Discuss with Infectious Diseases</td></tr>
<tr><td colspan="4">Febrile children > 3 months who are well without signs of serious illness (as judged by a senior clinician) are not routinely recommended antibiotics. Observation and investigation is recommended. If meningitis is suspected, refer to ChAMP empiric guidelines: Meningitis and meningoencephalitis</td></tr>
<tr><td>Fever in an asplenic patient</td><td>IV ceftriaxone 50 mg/kg/dose (to a maximum of 2 grams) 24 hourly
IF SHOCKED manage as per Community Acquired Sepsis</td><td colspan="2">Discuss with Infectious Diseases</td><td>Discuss with Infectious Diseases</td></tr>
</table>

a. Children known or suspected to be colonised with multi-resistant organisms may need to have their empiric therapy/prophylaxis modified.
Children suspected of having MRSA include:
   i. Children previously colonised with MRSA. Check for MicroAlert B or C on iCM.
   ii. Household contacts of MRSA colonised individuals
   iii. In children who reside in regions with higher MRSA rates (e.g. Kimberley, Goldfields and the Pilbara) a lower threshold for suspected MRSA should be given
   iv. Children with recurrent skin infections or those unresponsive to ≥ 48 of beta-lactam therapy. For further advice, discuss with Infectious Diseases.

Children suspected of have resistant gram negative infection include:
   i. Children colonised with resistant gram negative bacteria. Check for MicroAlert G or Y on iCM.
   ii. Household contacts of individuals colonised with resistant gram negative bacteria
   iii. Children with recent international travel

b. Refer to the ChAMP Beta-lactam Allergy Guideline

c. Neonatal viral infections and congenital syphilis can sometimes present as neonatal sepsis. Consider testing neonate +/- mothers for HSV, enterovirus, parechnovirus and syphilis

d. Early manifestations of neonatal herpes simplex virus (HSV) may be subtle and nonspecific. Consider HSV testing, liver function tests and **ADD** IV aciclovir for suspected HSV infection; dose as per KEMH neonatal guidelines. For further information refer to ASID perinatal guidelines

HSV infection may manifest as:
   - Localised skin, eye and mucous membranes disease (~45%)
   - Central nervous system (CNS) disease (~30%)
   - Disseminated disease - liver, lungs +/- CNS) (~25%)

Maternal history of HSV may be absent in >75% cases of neonatal HSV and up to 40% of neonatal HSV cases will not have vesicular skin lesions. Disseminated disease presents with viral sepsis, and may be indistinguishable from sepsis of another cause, i.e. hepatitis with elevated liver transaminases, respiratory collapse, pneumonitis, disseminated intravascular coagulation (DIC). CNS disease may present with lethargy, poor feeding, bulging fontanel and seizures.

e. IV gentamicin: may be given as a push over 3 to 5 minutes in critically unwell patients.
- Children ≥4 weeks – 10 years: 7.5 mg/kg/dose (to a maximum of 320 mg) 24 hourly
- >10 years to 18 years: 6-7 mg/kg/dose (to a maximum of 560 mg) 24 hourly.
- Therapeutic drug monitoring required if therapy extends beyond 72 hours.

Related CAHS internal policies, procedures and guidelines
Children's Antimicrobial Management Program (ChAMP) Policy (PCH Website)
ChAMP Empiric Guidelines
Sepsis recognition and management

References and related external legislation, policies, and guidelines
1. Antibiotic Writing Group (2023). eTG complete. West Melbourne, Therapeutic Guidelines Ltd.
2. Expert opinion – Paediatric Infectious Diseases Physicians

This document can be made available in alternative formats on request.

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