

# Guideline

## Empiric Antibiotic Guidelines for Paediatric Intensive Care Unit (PICU)

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<b>Applicable to</b>	All CHQ staff caring for PICU patients				
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### Purpose

This Guideline provides recommendations regarding best practice for empiric antibiotic treatment for patients admitted to the Paediatric Intensive Care Unit (PICU).

### Scope

This Guideline provides information for all Children's Health Queensland (CHQ) staff working in PICU Environment. This guideline is not intended for use outside of this clinical area without the advice of a Paediatric Infectious Diseases consultant.

### Related documents

#### Procedures, Guidelines, Protocols

- CHQ Antimicrobial Stewardship Program - <https://www.childrens.health.qld.gov.au/chq/health-professionals/antimicrobial-stewardship/>
- PICU Empiric Antibiotic Guideline (online version) - [https://www.childrens.health.qld.gov.au/wp-content/uploads/PDF/ams/DUG\\_Empiric.pdf](https://www.childrens.health.qld.gov.au/wp-content/uploads/PDF/ams/DUG_Empiric.pdf)
- Paediatric Tobramycin/Gentamicin Therapeutic drug monitoring : <http://qheps.health.qld.gov.au/childrenshealth/resources/clinforms/docs/658202.pdf>
- Paediatric Vancomycin Therapeutic drug monitoring: <http://qheps.health.qld.gov.au/childrenshealth/resources/clinforms/docs/658201.pdf>

## Standards of Antimicrobial Stewardship in Paediatric Intensive Care

- Take cultures before starting antibiotics
- Cease antibiotics if cultures negative at 48 hours except if:
  - the child has signs of severe sepsis
  - cultures were taken after antibiotic treatment was started (discuss with Infectious Diseases)
  - ongoing infection is likely
- Change to narrow spectrum antibiotics once sensitivities are known, discuss with Infectious Diseases (ID)
- Recommendations for treatment duration in confirmed infections:
  - pneumonia/ventilator associated pneumonia: 5 to 7days
  - sepsis, negative blood culture: 5 to 7 days
  - blood-culture positive sepsis: 7 to 14 days (discuss with ID)
- Consult ID specialist
  - to confirm appropriate treatment and duration for positive culture results
  - when escalation to broader antibiotic treatment is considered for ongoing infection
- Document indication and planned duration in PICU electronic prescribing system (Metavision ®) when ordering antibiotic drug (use "Comments", e.g. "Vancomycin 150mg every 6 hours IV. Comments: For 5 days for MRSA pneumonia")
- Daily review of antibiotic plan (stop/continue antibiotics) should occur at PICU morning ward round.
- For gentamicin and vancomycin: Seek pharmacist/ID advice on appropriate therapeutic drug monitoring (TDM)
  - Paediatric Tobramycin/Gentamicin Therapeutic drug monitoring :  
<http://qheps.health.qld.gov.au/childrenshealth/resources/clinforms/docs/658202.pdf>
  - Paediatric Vancomycin Therapeutic drug monitoring:  
<http://qheps.health.qld.gov.au/childrenshealth/resources/clinforms/docs/658201.pdf>
- For patients in renal failure: Seek pharmacist advice on appropriate dosing

## Guideline for Empiric Antibiotic Use in PICU

### 1. MENINGITIS

**< 2 months of age:** Cefotaxime 50mg/kg IV every 6 hours (Neonates: week 1 of life: every 12 hours) **plus** Ampicillin 50mg/kg IV every 6 hours (Neonates: week 1 of life: every 12 hours)

**> 2 months of age:** Cefotaxime 50mg/kg (max 2gram) IV every 6 hours  
**OR** Ceftriaxone 50mg/kg (max 2gram/dose) IV every **12** hourly (for use in patients >1 month of age)

**> 3 months of age: give Dexamethasone** 0.15mg/kg/dose IV every 6 hours for 4 days **if able to start prior to or within 1 hour of antibiotics**

**If gram positive cocci in cerebrospinal fluid (CSF) or *Streptococcus pneumoniae* suspected,**

**ADD** Vancomycin 15mg/kg (max 750mg for initial dose) IV every 6 hours (Neonates: week 1 of life: every 12 hours, week 2-4: IV every 8 hours)

**If HSV encephalitis suspected (particular risk factors include: < 6 months of age, loss of consciousness, seizures),**

**ADD** Aciclovir 20mg/kg/dose IV every 8 hours (Term infants up to 3 month old)

- Preterm infants: 20mg/kg/dose IV every 12 to 24 hourly;
- >3 month old to 12 years old: 500mg/m<sup>2</sup>/dose IV every 8 hours;
- >12 years old: 10mg/kg/dose IV every 8 hours

### 2. COMMUNITY ACQUIRED SEPSIS

→if Meningitis suspected treat as stated under MENINGITIS

**< 2 months of age:**

Ampicillin (or Amoxicillin) 50mg/kg IV every 6 hours (Neonates: week 1 of life: every 12 hours)

**PLUS** Gentamicin 7.5mg/kg IV once daily (max 320mg for initial dose if <10years old; max 640mg if >10years old; Neonates: week 1 of life: 5mg/kg IV once daily)

**> 2 months of age:** Cefotaxime 50mg/kg (max 2gram) IV every 6 hours

**OR** Ceftriaxone 100mg/kg (max 4gram) IV once daily (for use in patients >1 month of age)

**IF risk factors for non-multiresistant MRSA (previous nmMRSA, history of boils):**

**ADD** Lincomycin 15mg/kg (max 1.2gram) IV every 8 hours

**IF septic shock requiring inotropes:**

**ADD** Vancomycin 15mg/kg (max 750mg for initial dose) IV every 6 hours (Neonates: week 1 of life: every 12 hours, week 2-4: IV every 8 hours)

**AND ADD** Gentamicin 7.5mg/kg IV once daily (max 320mg for initial dose if <10years old; max 640mg if >10 years old; Neonates: week 1 of life: 5mg/kg IV once daily)

### 3. NOSOCOMIAL SEPSIS

Ceftazidime 50mg/kg/dose (Max 2 gram) IV every 8 hours (Neonates: week 1 of life: every 12 hours)

**IF Central venous Line in-situ:**

**ADD** Vancomycin 15mg/kg (max 750mg for initial dose) IV every 6 hours (Neonates: week 1 of life: every 12 hours, week 2-4: IV every 8 hours)

**IF septic shock:**

**ADD** Vancomycin 15mg/kg (max 750mg for initial dose) IV every 6 hours (Neonates: week 1 of life: every 12 hours, week 2-4: IV every 8 hours)

**AND ADD** Gentamicin 7.5mg/kg IV once daily (max 320mg for initial dose if <10years old; max 640mg if >10 years old; Neonates: week 1 of life: 5mg/kg IV once daily)

**If nosocomial sepsis with meningitis - discuss with Infectious Diseases Consultant**

### 4. SEPSIS in immunocompromised host with febrile neutropenia

Piperacillin-tazobactam 100mg/kg (max 4gram Piperacillin component) IV every 6 hours (< 1 month: every 8 hours)

**PLUS** Gentamicin 7.5mg/kg IV once daily (max 320mg for initial dose if <10 years old; max 640mg if >10 years old; Neonates: week 1 of life: 5mg/kg IV once daily)

**PLUS** Vancomycin 15mg/kg (max 750mg for initial dose) IV every 6 hours (Neonates: week 1 of life: every 12 hours, week 2-4: IV every 8 hours)

### 5. PNEUMONIA

#### 5a. Community acquired pneumonia

**All ages and severe:** Cefotaxime 50mg/kg (max 2gram) IV every 6 hours (Neonate: week 1 of life: every 12 hours)

**If >5 year old consider adding:** Azithromycin 10mg/kg (max 500mg) IV daily

(Oral macrolide alternative: Roxithromycin 4mg/kg (max 150mg) oral every 12 hours) if mycoplasma/ atypical pneumonia suspected.

**IF empyema or risk factors for non-multiresistant MRSA (previous nmMRSA, history of boils),**

**ADD** Lincomycin 15mg/kg (max 1.2gram) IV every 8 hours.

**IF life threatening pneumonia or multi-resistant MRSA suspected,**

**ADD** Vancomycin 15mg/kg (max 750mg for initial dose) IV every 6 hours (Neonates: week 1 of life: every 12 hours, week 2-4: IV every 8 hours)

**PLUS** Lincomycin 15mg/kg (max 1.2gram) IV every 8 hours.

#### 5b. Nosocomial / ventilator-associated pneumonia

**If less than 5 days in PICU:**

Cefotaxime 50mg/kg (max 2gram) IV every 6 hours (Neonates: week 1 of life: every 12 hours)

**OR** Ceftriaxone 100mg/kg (max 4gram) IV once daily (for use in patients >1 month of age)

**If more than 5 days in PICU:**

Ceftazidime 50mg/kg (max 2gram) IV every 8 hours (neonates week 1 of life: every 12 hours)

### 6. PERTUSSIS

Azithromycin 10mg/kg (max 500mg) daily IV or oral for 5 days

**7. SURGICAL WOUND INFECTION**

Flucloxacillin 50mg/kg (max 2gram) IV every 4 to 6 hourly (Neonates: week 1 of life: every 12 hours, week 2-4: every 8 hours)

**PLUS** Gentamicin 7.5mg/kg IV once daily (max 320mg for initial dose if <10 years old; max 640mg if >10 years old; Neonates: week 1 of life: 5mg/kg IV once daily)

**IF life threatening suspected staphylococcal wound infection,**

**ADD** Vancomycin 15mg/kg (max 750mg for initial dose) IV every 6 hours (Neonates: week 1 of life: every 12 hours, week 2-4: IV every 8 hours)

**8. DEEP CARDIAC SURGICAL WOUND INFECTION (MEDIASTINITIS SUSPECTED)**

Gentamicin 7.5mg/kg IV once daily (max 320mg for initial dose if <10 years old; max 640mg if >10 years old; Neonates: week 1 of life: 5mg/kg IV once daily)

**PLUS** Vancomycin 15mg/kg (max 750mg for initial dose) IV every 6 hours (Neonates: week 1 of life: every 12 hours, week 2-4: IV every 8 hours)

**9. ABDOMINAL INFECTION (including Peritonitis and Necrotising Enterocolitis)**

Ampicillin (or Amoxicillin) 50mg/kg IV every 6 hours (Neonates: week 1 of life: every 12 hours)

**PLUS** Gentamicin 7.5mg/kg IV once daily (max 320mg for initial dose if <10years old; max 640mg if >10years old; Neonates: week 1 of life: 5mg/kg IV once daily)

**PLUS** Metronidazole IV 7.5mg/kg/dose IV every 8 hours (Max 500mg/dose) (Neonates: week 1 of life: every 24 hours; weeks 2-4: every 12 hours)

**10. TOXIC SHOCK SYNDROME**

**IF organism unknown:**

Cefotaxime 50mg/kg (max 2gram) IV every 6 hours (Neonate: week 1 of life: every 12 hours)

**PLUS** Vancomycin 15mg/kg (max 750mg for initial dose) IV every 6 hours (Neonates: week 1 of life: every 12 hours, week 2-4: IV every 8 hours)

**PLUS** Lincomycin 15mg/kg (max 1.2gram) IV every 8 hours

**PLUS** consider Intragam® 2gram/kg IV once

**IF known Group A Streptococcal infection:**

Benzylpenicillin 60mg/kg (max 2.4gram) IV every 4 hours (Neonates: week 1 of life: every 12 hours)

**PLUS** Lincomycin 15mg/kg (max 1.2gram) IV every 8 hours

**PLUS** consider Intragam® 2gram/kg IV once

**IF necrotising fasciitis:**

Cefotaxime 50mg/kg (max 2gram) IV every 6 hours (Neonate: week 1 of life: every 12 hours)

**PLUS** Vancomycin 15mg/kg (max 750mg for initial dose) IV every 6 hours (Neonates: week 1 of life: every 12 hours, week 2-4: IV every 8 hours)

**PLUS** Lincomycin 15mg/kg (max 1.2gram) IV every 8 hours.

**If external wound/ inoculation associated with necrotising fasciitis,**

Replace Cefotaxime with Meropenem IV 40mg/kg/dose (up to 2gram) 8 hourly (neonatal dosing: week 1 and 2 of life: 40ma/ka/dose every 12 hourly, week 3 and 4 of life: 40ma/ka/dose every 8 hourly)

## 11. URINARY TRACT INFECTION

Ampicillin (or Amoxicillin) 50mg/kg (max 2gram) every 6 hours IV (Neonates: week 1 of life: every 12 hours)

**PLUS** Gentamicin 7.5mg/kg IV once daily (max 320mg for initial dose if <10 years old; max 640mg if >10 years old; Neonates: week 1 of life: 5mg/kg IV once daily)

## Consultation

Key stakeholders who reviewed this version

- Dr Julia Clark, Director, Infection Management and Prevention Service (LCCH)
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- Dr Sophie Wen, Infection Specialist (LCCH)
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- Nicolette Graham, Antimicrobial Stewardship Pharmacist (LCCH)
- Michele Cree, Clinical Pharmacy Team Leader - Paediatric Intensive Care (LCCH)

## References and suggested reading

- Taketomo, C.K. (ed). (2015-2016), In Pediatric Dosage handbook International , 22nd edn, Lexi-Comp: USA.
- British National Formulary for Children. (2013), 'BNF for Children 2015-2016,' BNFC website: London, UK, [online], Available at: <http://www.bnf.org/bnf/index.htm>
- Neofax™, Micromedex Healthcare solutions, available via CKN: <http://neofax.micromedexsolutions.com/neofax/neofax.php> (view in Mozilla Firefox browser)
- Therapeutic guidelines (eTG) Published November 2014, available via CKN: <https://tgldcdp.tg.org.au/etgAccess>

• **Guideline revision and approval history**

Version No.	Modified by	Amendments authorised by	Approved by
1.0	Infectious Diseases Consultant (IMPS, RCH) Infectious Diseases Consultant (Mater) Director of PICU (RCH) Paediatric Intensivist (Mater) Antimicrobial Stewardship Pharmacist (RCH) Paediatric Intensive Care Pharmacist (Mater)	Medicines Advisory Committee (RCH)	General Manager Operations
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<b>Accreditation references</b>	EQiP National Standards: 3 – Preventing & Controlling Healthcare Associated Infections; 4 – Medication Safety