

**PICU
Antibiotic
Protocol
2011
Updated 2019**

Are there signs of a bacterial infection?
Fever or temperature instability plus an increasing
IT ratio (>0.2) or pro-calcitonin >2ng/ml

**Is it likely to be a PICU- or
hospital-acquired infection?**
PICU stay >7 days?

**If NO, follow
RCH Clinical
Practice
guidelines**

Are there signs of severe sepsis?
Hypotension or increased vasoactive drug
requirement with no other likely cause, worsening
hypoxaemia associated with new CXR infiltrates

No

Yes

**If cultures
negative
after 48
hours cease
antibiotics**

**Flucloxacillin and gentamicin
or benzylpenicillin, gentamicin &
metronidazole if GI sepsis**

Is there an indication for vancomycin?

Known methicillin-resistant *Staph aureus*
colonisation

A central line alone is NOT an absolute
indication to use vancomycin over
flucloxacillin as first-line treatment for
PICU acquired sepsis

High risk of methicillin-resistant coagulase
negative *Staph aureus* infection: such as a VP
shunt or previous MRSE (Cons) sepsis with
CVC, or severe pneumonia / empyema in
indigenous or Pacific Island children

Yes

No

**Is there a high likelihood of
gentamicin-resistant Gram-
negative sepsis?**

Known colonisation or previous
infection with *Klebsiella* spp
or *Enterobacter* spp?

Recent treatment with 3rd or
higher gen cephalosporins,
quinolones, pip/tazo,
carbapenems

No

Yes

**PICU Consultant
approval required:**
Vancomycin and
gentamicin OR
Clindamycin and
gentamicin

**Flucloxacillin
and gentamicin**

**PICU Consultant
and DUC approval
required:**
Meropenem +/-
Vancomycin +/-
Amikacin

**If cultures negative at 48 hours:
cease antibiotics or change to
penicillin and gentamicin or
flucloxacillin and gentamicin**

Antibiotics in the PICU

We have a problem with resistant Gram-negative bacteria in PICU, the extended-spectrum beta-lactamase producing *Klebsiella* and *Enterobacter* spp. These have emerged since 2000, and had led to the increased use of meropenem, piperacillin-tazobactam and other high-grade antibiotics. If we do not restrict the use of meropenem and other antibiotics we will see infections for which there is no effective antibiotics treatment.

The use of vancomycin is also concerning. It provides selection pressure for vancomycin-resistant enterococcus (VRE), which is deadly in the PICU.

In deciding which antibiotics to give we need to consider five things:

1. Probability of bacterial infection

- Fever or temperature instability, increasing IT ratio or pro-calcitonin

2. Is infection likely to be community or hospital / PICU-acquired

3. Are there are signs of severe sepsis?

- Signs of severe sepsis: increased inotropic requirement with no other likely cause, worsening hypoxaemia associated with new CXR infiltrates.

4. Likely pathogens

5. Likely antimicrobial susceptibility

In choosing antibiotics for community-acquired infection in the ICU refer to the RCH Clinical Practice Guidelines

First-line treatment of PICU acquired sepsis should be flucloxacillin and gentamicin (or benzylpenicillin, gentamicin and metronidazole for GI tract sepsis). Note we still give benzylpenicillin (+/- macrolide) for uncomplicated pneumonia of moderate severity.

MRSA is uncommon in PICU. Although flucloxacillin won't cover the majority of coagulase-negative Staphs, many of these isolates are contaminants, or the infection is indolent, so *changing-up* to vancomycin if an MRSE is isolated will not result in adverse clinical outcomes.

Indications for vancomycin

Signs of serious sepsis PLUS

- Known methicillin-resistant *Staph aureus* colonisation
- High risk of methicillin resistant coagulase negative *Staph aureus* infection: such as a VP shunt or previous MRSE sepsis with CVC
- A central line alone is NOT an absolute indication to use vancomycin rather than flucloxacillin as first-line treatment for PICU acquired sepsis
- Severe pneumonia with empyema in a child with risk factors for MRSA (indigenous, Pacific Islander)

Indications for meropenem or amikacin

Signs of serious sepsis PLUS

- Known colonisation or infection with *Klebsiella* spp or *Enterobacter* spp
- Isolation of a Gram negative bacteria from blood culture or other infected site
- Approval is required by the RCH Drug Usage Committee (DUC)

STOPPING ANTIBIOTICS or SCALING DOWN ANTIBIOTICS

Before antibiotics are started cultures (blood, urine +/- BAL) should be taken. All antibiotic must be reviewed at 48 hours. Antibiotics should be ceased at 48 hours if cultures are negative.

If it is not appropriate to cease antibiotics (because of a high probability of bacterial infection or ongoing signs of sepsis) antibiotic therapy can be scaled down when 48 hour cultures are negative. Appropriate antibiotics to scale down to depend on the clinical context, but include benzypenicillin and gentamicin for culture-negative severe pneumonia or sepsis in the PICU. When scaling down antibiotics, the RCH Clinical Practice Guidelines can be followed for the treatment of focal infections.