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Antibiotics

Infection	Likely organisms	Initial antimicrobials1 () = maximum dose	Duration of treatment2 and other comments
CENTRAL NERVOUS SYSTEM/EYE			
Brain abscess	S. milleri and other streptococci Anaerobes Gram-negatives *S. aureus*	Flucloxacillin 50 mg/kg (2 g) iv 6 H **and** Third generation cephalosporin3 **and** Metronidazole 15 mg/kg (1 g) iv stat, then 7.5 mg/kg (500 mg) iv 8 H	3 weeks minimum Penicillin hypersensitivity: substitute Flucloxacillin with Vancomycin 15 mg/kg (500 mg) iv 6 H
Post-neurosurgery	As above plus *S. epidermidis*	As above but substitute Flucloxacillin with Vancomycin 15 mg/kg (500 mg) iv 6 H	
Encephalitis	Herpes simplex virus Enteroviruses Arboviruses M. pneumoniae	Aciclovir 20 mg/kg iv 8 H (age <3 months) 500 mg/m2 iv 8 H (age 3 months to 12 years) 10 mg/kg iv 8 H (age >12 years)	3 weeks minimum Consider adding Azithromycin if *M. pneumoniae* suspected
Meningitis Over 2 months of age	S. pneumoniae4 N. meningitidis H. influenzae type b5	Third generation cephalosporin3	S. pneumoniae 10 days N. meningitidis 5–7 days H. influenzae type b 7–10 days Consider addition of Dexamethasone
Over 2 months of age and possibility of penicillin-resistant pneumococci4 (www.snipurl .com/vanco)	As above	Third generation cephalosporin3 ***and*** Vancomycin 15 mg/kg (500 mg) iv 6 H	

Under 2 months of age	As above plus Group B streptococci E. coli and other Gram-negative coliforms L. monocytogenes	Third generation cephalosporin3 ***and*** Benzylpenicillin	Gram-negative 3 weeks GBS/Listeria 2–3 weeks Substitute Benzylpenicillin with Vancomycin if possibility of penicillin-resistant pneumococci4
With shunt infection, post-neurosurgery, head trauma or CSF leak	As for over 2 months of age plus S. epidermidis S. aureus Gram-negative coliforms incl. P. aeruginosa	Vancomycin 15 mg/kg (500 mg) iv 6 H ***and*** Ceftazidime 50 mg/kg (2 g) iv 8 H	10 days minimum
Contact prophylaxis	N. meningitidis	Rifampicin 10 mg/kg (600 mg) po 12 H	2 days (alternatives: see Table 30.3)
Contact prophylaxis	H. influenzae type b	Rifampicin 20 mg/kg (600 mg) po 24 H	4 days (alternatives: see Table 30.3)

Postseptal (orbital) cellulitis	S. aureus H. influenzae spp. S. pneumoniae M. catarrhalis Gram-negatives Anaerobes	Flucloxacillin 50 mg/kg (2 g) iv 6 H ***and*** Third generation cephalosporin3	10 days minimum Rule out meningitis Consider adding Metronidazole if not responding
Preseptal (periorbital) cellulitis Mild	Group A streptococci S. aureus H. influenzae spp.	Amoxycillin/clavulanate [400/57 mg per 5 mL] 22.5 mg/kg (875 mg) (Amoxycillin component) = 0.3 mL/kg (11 mL) po 12 H	7–10 days Consider non-infective cause in trivial cases
Severe, or not responding, or under 5 years of age and non-Hib immunised	As above plus H. influenzae type b5	Flucloxacillin 50 mg/kg (2 g) iv 6 H ***and*** Third generation cephalosporin3	
CARDIOVASCULAR			

Endocarditis Native valve or homograft	Viridans streptococci Other streptococci *Enterococcus* spp. *S. aureus*	Benzylpenicillin 60 mg/kg (2 g) iv 6 H ***and*** Gentamicin 2.5 mg/kg (240 mg) iv 8 H* ***and*** Flucloxacillin 50 mg/kg (2 g) iv 6 H	4–6 weeks *Gentamicin 1 mg/kg (80 mg) iv 8 H for 1–2 weeks when used only for synergy (Gentamicin monitoring is generally not required with low dose in this setting)
Artificial valve or post surgery	As above plus S. epidermidis	Vancomycin 15 mg/kg (500 mg) iv 6 H ***and*** Flucloxacillin 50 mg/kg (2 g) iv 6 H ***and*** Gentamicin 2.5 mg/kg (240 mg) iv 8 H*	
Endocarditis prophylaxis For dental procedures only	Viridans streptococci S. aureus S. pneumoniae Other Gram-positive cocci Enterococcus spp.	Amoxycillin 50 mg/kg (2 g) Local anaesthetic: give po 1 hour before procedure General anaesthetic: give iv with induction	Penicillin hypersensitivity: substitute Amoxycillin with Clindamycin 20 mg/kg (600 mg) po or iv

Infection	**Likely organisms**	**Initial antimicrobials1 () = maximum dose**	**Duration of treatment2 and other comments**
GASTROINTESTINAL			
Diarrhoea Salmonella spp. isolated in infant under 3 months of age or in immunocompromised	Salmonella spp.	Third generation cephalosporin3	5–7 days Antibiotic treatment is generally unnecessary for most other organisms
Antibiotic associated	*C.* difficile	Metronidazole 7.5 mg/kg (400 mg) po 8 H	7–10 days
Giardiasis	*G.* lamblia	Metronidazole 30 mg/kg (2 g) po daily or Tinidazole 50 mg/kg (2 g) po	3 days Single dose

Peritonitis or ascending cholangitis	Gram-negative coliforms Anaerobes Enterococcus spp.	Ampicillin or Amoxycillin 50 mg/kg (2 g) iv 6 H **and** Gentamicin 7.5 mg/kg (360 mg) iv daily (<10 years) 6 mg/kg (360 mg) iv daily (≥10 years) **and** Metronidazole 15 mg/kg (1 g) iv stat, then 7.5 mg/kg (500 mg) iv 8 H	Up to 14 days See footnote 6 re Gentamicin dosing/monitoring
Threadworm (Pinworm)	Enterobius vermicularis	Mebendazole 50 mg po (<10 kg) 100 mg po (≥10 kg)	Single dose; may need to repeat after 14 days Treat whole family
GENITOURINARY			
Urinary tract infection Over 6 months of age and not sick	E. coli P. mirabilis K. oxytoca Other Gram-negatives	Trimethoprim 4 mg/kg (150 mg) po 12 H **or** if oral liquid is necessary then Co-trimoxazole (Trimethoprim/Sulphamethoxazole 8/40 mg/mL) 0.5 mL/kg (20 mL) po 12 H	5 days
Under 6 months of age or sick or acute pyelonephritis	As above plus Enterococcus spp.	Benzylpenicillin 60 mg/kg (2 g) iv 6 H ***and*** Gentamicin 7.5 mg/kg (360 mg) iv daily (<10 years) 6 mg/kg (360 mg) iv daily (≥10 years) (For infants under 1 month of age, see doses in 'Septicaemia in neonate' section)	5–7 days for UTI 10–14 days for pyelonephritis See footnote 6 re Gentamicin dosing/monitoring

Prophylaxis	As above	Trimethoprim 2 mg/kg (150 mg) po daily **or** if oral liquid is necessary then Co-trimoxazole (Trimethoprim/Sulphamethoxazole 8/40 mg/mL) 0.25 mL/kg (20 mL) po daily	Routine prophylaxis is no longer recommended
RESPIRATORY			
Epiglottitis	H. influenzae type b5	Ceftriaxone 50 mg/kg (1 g) iv daily	5 days consider addition of Dexamethasone
Gingivostomatitis In immunocompromised	Herpes simplex virus	Aciclovir 500 mg/m2 iv 8H (age 3 months to 12 years) 10 mg/kg iv 8 H (age >12 years)	7 days Treatment is only recommended in the immunocompromised

Otitis externa Acute diffuse	S. aureus S. epidermidis P. aeruginosa Proteus spp. Klebsiella spp.	Topical steroid/antibiotic drops	7 days Clean ear canal (± insertion of wick soaked in drops if ear canal oedematous)
Acute localised (furuncle) ± cellulitis	S. aureus Group A streptococci	Flucloxacillin 50 mg/kg (2 g) iv 6 H	5 days
Failure of first-line treatment, high fever or severe persistent pain	As above plus P. aeruginosa	Ticarcillin/Clavulanate 50 mg/kg (3 g) (Ticarcillin component) iv 6 H	14 days minimum Consider fungal infection
Otitis media	Viruses S. pneumoniae M. catarrhalis H. influenzae spp. Group A streptococci	Consider no antibiotics for 48 hours if over 6 months of age ***or*** Amoxycillin 15 mg/kg (500 mg) po 8 H	5 days Consider Amoxycillin/clavulanate after 48 hours if inadequate response to Amoxycillin
Pertussis	B. pertussis	Azithromycin 10 mg/kg (500 mg) ***or*** Clarithromycin 7.5 mg/kg (500 mg) po 12 H	5 days 7 days Can be given up to 3 weeks after contact with index case or if symptoms <3 weeks

Infection	**Likely organisms**	**Initial antimicrobials1 () = maximum dose**	**Duration of treatment2 and other comments**
Pneumonia Mild (outpatient)	Viruses S. pneumoniae H. influenzae spp.	Amoxycillin 25 mg/kg (500 mg) po 8 H	5 days
Moderate (inpatient)	As above	Benzylpenicillin 60 mg/kg (2 g) iv 6 H	

Severe systemic toxicity or pneumatocoele	As above plus S. aureus Group A streptococci Gram-negatives	Flucloxacillin 50 mg/kg (2 g) iv 6 H ***and*** Third generation cephalosporin3	10 days minimum Consider adding Azithromycin 15 mg/kg (500 mg) iv stat, then 5 mg/kg (200 mg) iv daily to cover *M. pneumoniae* and other atypical pathogens
Tonsillitis	Viruses Group A streptococci	Consider no antibiotics (particularly if <4 years) ***or*** Phenoxymethylpenicillin (Penicillin V) 250 mg po 12 H (<10 years) 500 mg po 12 H (≥10 years)	10 days
SKIN/SOFT TISSUE/BONE			
Bites (animal/human)	Viridans streptococci S. aureus Group A streptococci Oral anaerobes E. corrodens Pasteurella spp. (cat and dog) C. canimorsus (dog)	Amoxycillin/Clavulanate (400/57 mg/5 mL) 22.5 mg/kg (875 mg) (Amoxycillin component) 0.3 mL/kg (11 mL) po 12 H	5 days for infected bite For otherwise healthy individuals, antibiotic therapy is usually not necessary for bites with a low risk of infection Check tetanus immunisation status
If severe, penetrating injuries, esp. involving joints or tendons	As above	Ticarcillin/Clavulanate 50 mg/kg (3 g) (Ticarcillin component) iv 6 H	14 days
Cellulitis Mild (outpatient)	Group A streptococci S. aureus	Cephalexin 25 mg/kg (500 mg) po 6 H **or** Cephalexin 33 mg/kg (500 mg) po 8 H	5–10 days
Moderate/severe (inpatient)	As above	Flucloxacillin 50 mg/kg (2 g) iv 6 H	

Facial cellulitis in child under 5 yr of age and non-Hib immunised	As above plus S. pneumoniae H. influenzae spp.5	Flucloxacillin 50 mg/kg (2 g) iv 6 H **and** Third generation cephalosporin3	
Necrotising fasciitis	As above	Vancomycin 15 mg/kg (500 mg) iv 6 H **and** Meropenem 25 mg/kg (1 g) iv 8 H **and** Clindamycin 15 mg/kg (600 mg) iv 8 H	Consider IVIG
Head lice	Pediculus humanus var. capitis	1% permethrin liquid or cream rinse	Repeat after one week
Impetigo	Group A streptococci S. aureus	Mupirocin 2% ointment top 8 H if localised ***or*** Cephalexin 33 mg/kg (500 mg) po 8 H	5–10 days
Lymphadenitis (cervical) Mild	S. aureus Group A streptococci Oral anaerobes	Cephalexin 25 mg/kg (500 mg) po 6 H ***or*** Cephalexin 33 mg/kg (500 mg) po 8 H	7 days
Severe	As above	Flucloxacillin 50 mg/kg (2 g) iv 6 H	
Osteomyelitis Uncomplicated	S. aureus Group A streptococci S. pneumoniae	Flucloxacillin 50 mg/kg (2 g) iv 6 H	3 weeks for uncomplicated cases2
If under 5 yr of age and non-Hib immunised	As above plus H. influenzae type b5	Flucloxacillin 50 mg/kg (2 g) iv 6 H ***and*** Third generation cephalosporin3	
In patient with sickle cell anaemia	As above plus Salmonella spp.	Flucloxacillin 50 mg/kg (2 g) iv 6 H ***and*** Third generation cephalosporin3	

With penetrating foot injury	As above plus P. aeruginosa	Ticarcillin/Clavulanate 50 mg/kg (3 g) (Ticarcillin component) iv 6 H	Surgical intervention important See footnote 6 re Gentamicin dosing/monitoring Check tetanus immunisation status

Infection	**Likely organisms**	**Initial antimicrobials1 () = maximum dose**	**Duration of treatment2 and other comments**
Scabies	*Sarcoptes scabiei*	5% permethrin cream top	One application from neck down; may need to repeat after 14 days Treat whole family
Septic arthritis	As for osteomyelitis	As for osteomyelitis	3 weeks for uncomplicated cases.2 Always consider surgical drainage
Shingles In immunocompromised or involving eye	Varicella zoster virus	Aciclovir 500 mg/m2 iv 8H (age 3 months to 12 years) 10 mg/kg iv 8 H (age >12 years) ***and*** Aciclovir ointment to eye 5 times per day	7 days Shingles in immunocompetent children does not generally require treatment
SEPTICAEMIA (UNDER 2 MONTHS OF AGE)			
Septicaemia Community-acquired infection	Group B streptococci E. coli and other Gram-negative coliforms L. monocytogenes H. influenzae spp.5 plus those listed below for 'Septicaemia with unknown CSF'	Benzylpenicillin 60 mg/kg iv 12 H (first week of life) 6 H (1–4 weeks of age) 4H (>4 weeks of age) **and** Third generation cephalosporin3	Add Flucloxacillin 50 mg/kg iv 12 H (first week of life) 8H (1–4 weeks of age) 6H (>4 weeks of age) if infection with *S. aureus* suspected (e.g. umbilical infection) Duration depends on culture results Premature neonates require special dosing consideration
If abdominal source suspected	As above plus Anaerobes	Amoxycillin or Ampicillin 50 mg/kg (2 g) iv 6 H **and** Gentamicin 5 mg/kg iv 24 H (1st week of life) 7.5 mg/kg iv daily thereafter **and** Metronidazole 15 mg/kg iv stat, then 7.5 mg/kg iv 12 H	
SEPTICAEMIA (OVER 2 MONTHS OF AGE)			

Septicaemia with unknown CSF	S. pneumoniae4 N. meningitidis S. aureus Group A streptococci Gram-negatives	Flucloxacillin 50 mg/kg (2 g) iv 6 H† **and** Third generation cephalosporin3	†Substitute Flucloxacillin with Vancomycin 15 mg/kg (500 mg) iv 6 H if central line *in situ* or suspected MRSA infection Consider adding IVIG and Clindamycin 10 mg/kg (600 mg) iv 6 H if suspect Gram-positive toxic shock syndrome Duration depends on culture results

Septicaemia with normal CSF	As above	Flucloxacillin 50 mg/kg (2 g) iv 6 H† **and** Gentamicin 7.5 mg/kg (360 mg) iv daily (<10 years) 6 mg/kg (360 mg) iv daily (≥10 years)	
In non-Hib immunised	As above plus H. influenzae type b5	Flucloxacillin 50 mg/kg (2 g) iv 6 H† **and** Third generation cephalosporin3	
In neutropenic patient	As above plus Enterococcus spp. P. aeruginosa	Piperacillin/Tazobactam 100 mg/kg (4 g) (Piperacillin component) iv 6H **and** Amikacin 22.5 mg/kg (1.5 g) iv daily (<10 years) 18 mg/kg (1.5 g) iv daily (≥10 years)	Local protocols for fever and neutropenia may differ Target trough (<2 mg/L pre 3rd dose)
In neutropenic patient with potential line infection	As above plus Gram-positive cocci incl. S. epidermidis	Piperacillin/Tazobactam as above **and** Amikacin as above **and** consider Vancomycin 15 mg/kg (500 mg) iv 6 H	

Notes to antimicrobial guidelines

Further information available at www.snipurl.com/RCHantibiotics.

These guidelines have been developed to assist doctors with their choice of initial empiric treatment. Except where specified, they do not apply to neonates or immunocompromised patients. Always ask about previous hypersensitivity reactions to antibiotic. The choice of antimicrobial, dose and frequency of administration for continuing treatment may require adjustment according to the clinical situation. The recommendations are not intended to be prescriptive and alternative regimens may also be appropriate.

1 Antimicrobial choice and dose

Antibiotics should be changed to narrow spectrum agents once sensitivities are known.
Dose adjustments may be necessary for neonates, and for children with renal or hepatic impairment. Alternative antimicrobial regimens may be more appropriate for neonates, immunocompromised patients or others with a special infection risk (e.g. cystic fibrosis, sickle cell anaemia).

Resistance to antimicrobials is an increasing problem worldwide. Of particular concern is the increasing inci- dence of penicillin-resistant pneumococci (see footnote 4). It is important to take into account local resistance patterns when using these guidelines.

2 Duration of treatment

Duration of treatment is given as a guide only and may vary with the clinical situation. ‘Step down’ from intra- venous to oral treatment is appropriate in many cases. Durations given generally refer to the minimum total intravenous and oral treatment.

3 Third generation cephalosporins

Cefotaxime: 50 mg/kg (2 g) iv 6 H
Ceftriaxone: usual 50 mg/kg (2 g) iv daily; severe (including meningitis and brain abscess) 100 mg/kg (2 g) iv daily or 50 mg/kg (1 g) iv 12 H
NB. Ceftriaxone should be avoided in neonates, particularly if <41 weeks gestation, jaundiced or receiving calcium containing solutions, including TPN.

4 Penicillin-resistant pneumococci (www.snipurl.com/vanco)

The prevalence of invasive strains that are highly resistant to Penicillin or cephalosporins in Melbourne remains low. A third generation cephalosporin remains the drug of first choice for the empiric treatment of meningitis. However, Vancomycin should be added if S. pneumoniae is suspected (www.snipurl.com/vanco). This should be stopped if sensitivity to a third generation cephalosporin is shown, as will be the case with most isolates. The prevalence of resistant strains is being monitored and this recommendation may change. Penicillin remains the drug of first choice for the empiric treatment of suspected pneumococcal pneumonia and other non-CNS infections, regardless of susceptibility. High doses of penicillin overcome resistance in this setting and should be used for confirmed non-CNS infection caused by penicillin-resistant pneumococci.

5 Invasive H. influenzae type b disease

Since the introduction of H. influenzae type b (Hib) immunisation, there has been a dramatic decline in the incidence of invasive disease. However, in children with potential invasive disease, who are not fully immunised against Hib, therapy should include cover against Hib.

6 Gentamicin dosing/monitoring

Once-daily administration of Gentamicin is safe and effective for most patients. Certain patients, such as neonates and those with cystic fibrosis, endocarditis or renal failure, may require special dosing consideration.
The regimen for monitoring Gentamicin levels is different for once-daily and 8, 12 or 18 H dosing, and depends on renal function:

Once-daily dosing

Normal renal function – if the patient is to have more than 3 doses, the trough level (pre-dose) should be checked before the third dose and then every 3 days (target level <1 mg/L).
Abnormal renal function – trough levels may need to be checked earlier and more frequently (target level <1 mg/L).

Renal failure – levels should be checked post-dose at 2, 12 and 24 hours, and adjusted accordingly. The results should be discussed with a specialist familiar with therapeutic drug monitoring.

8, 12 and 18 hourly dosing

The trough level should be checked before the fourth dose, and peak level 1 hour after the start of the fourth dose (target trough <2 mg/L, target peak 5–10 mg/L).
Levels should be repeated every 3 days, or more frequently if levels are inappropriate or if renal function is abnormal.