PEDIATRIC EMPIRIC ANTIMICROBIAL GUIDELINES

This guide does NOT apply to immunocompromised patients.

A thorough clinical assessment is required to identify any complicating factors which may necessitate alternative/additional therapy
Selection of empiric regimens may need to be tailored according to current local antibiogram or individual clinical factors.

Before starting anti-microbial therapy, take blood/urine/CSF and/or other relevant samples for culture wherever possible. Obtain appropriate dosage from current "Drug Dosage Guidelines". Consider the need for dose adjustments (e.g. renal impairment) and age-related contraindications for antimicrobials.
Caution for use in neonates under 44 weeks corrected gestational age.
REVIEW DAILY - Adjust treatment according to microbiologic results as soon as they become available.

Consult ID and/or relevant subspecialty team(s) if required

All drugs IV unless stated
(links to PEDIATRIC drug dosage guidelines)

Infection	Most likely pathogens	First choice	Penicillin allergy^	Refs**
Sepsis - unknown source				
Sepsis (<4 weeks)	*Streptococcus agalactiae* (GBS) *Escherichia coli* *Listeria monocytogenes* Herpes simplex virus (HSV)	Ampicillin + (Gentamicin or Cefotaxime) ± Acyclovir	Vancomycin + (Gentamicin or Cefotaxime) ± Acyclovir	BCCH FC
Sepsis (≥4 weeks)	*Neisseria meningitidis* *Streptococcus pneumoniae* *Escherichia coli* *Staphylococcus aureus*	Cefotaxime‡ ± Vancomycin*	Cefotaxime‡ ± Vancomycin	BCCH FC
CNS				
Meningitis (<4 weeks)	*Streptococcus agalactiae* (GBS) *Escherichia coli* *Listeria monocytogenes* Herpes simplex virus (HSV)	Ampicillin + Cefotaxime + Acyclovir	Vancomycin + Cefotaxime ± Acyclovir	IDSA BCCH
Meningitis (≥4 weeks)	*Neisseria meningitidis* *Streptococcus pneumoniae* *Haemophilus influenzae*	Cefotaxime‡ + Vancomycin ± Acyclovir	Cefotaxime‡ + Vancomycin ± Acyclovir	IDSA CPS BCCH
Encephalitis	Herpes simplex virus (HSV)	Acyclovir + Antibiotics as for "Meningitis"	Acyclovir + Antibiotics as for "Meningitis"	IDSA
Cerebral abscess or subdural empyema	*Streptococcus* spp. *Staphylococcus aureus* Anaerobic organisms Gram-negative organisms *Streptococcus pneumoniae* *Haemophilus influenzae*	Cefotaxime‡ + Vancomycin + Metronidazole	Cefotaxime‡ + Vancomycin + Metronidazole	FC
ENT, ocular and dental				
Streptococcal pharyngitis / tonsillitis	*Streptococcus pyogenes* (Group A Strep)	Penicillin V PO or Amoxicillin PO or Penicillin G	Cephalexin PO or Clindamycin PO or Clarithromycin PO or Cefazolin	IDSA RB
Bacterial acute otitis media	*Haemophilus influenzae* *Streptococcus pneumoniae* *Moraxella catarrhalis*	Amoxicillin PO or Amoxicillin-clavulanate PO	Cefuroxime PO or Clarithromycin PO	CPS AAP
Mastoiditis	*Streptococcus pneumoniae* *Streptococcus pyogenes* (Group A Strep) *Staphylococcus aureus*	Cefotaxime‡ ± Vancomycin ± Metronidazole	Cefotaxime‡ ± Vancomycin ± Metronidazole	FC
Sinusitis	*Haemophilus influenzae* *Streptococcus pneumoniae* *Moraxella catarrhalis* *Staphylococcus aureus* *Streptococcus pyogenes* (Group A Strep) Anaerobic organisms (older children)	Amoxicillin-clavulanate PO If IV treatment required, treat as for mastoiditis	Cefixime PO + Clindamycin PO If IV treatment required, treat as for mastoiditis	IDSA AAP BD
Cervical lymphadenitis	*Staphylococcus aureus* *Streptococcus pyogenes* (Group A Strep)	Cephalexin PO or Clindamycin PO* or Cefazolin ± Vancomycin*	Clindamycin PO or Cefazolin ± Vancomycin*	BD FC
Preseptal cellulitis	*Streptococcus pneumoniae* *Staphylococcus aureus*	Amoxicillin-clavulanate PO or Clindamycin PO* or Cefazolin ± Vancomycin*	Cefuroxime PO or Clindamycin PO* or Cefazolin ± Vancomycin*	AAP Long
Orbital cellulitis	*Staphylococcus aureus* *Streptococcus pneumoniae* Other *Streptococcus* spp. *Haemophilus influenzae*	Cefotaxime‡ ± Vancomycin ± Metronidazole	Cefotaxime‡ ± Vancomycin ± Metronidazole	Long

^Avoid all beta-lactam antibiotics (i.e. cephalosporins, carbapenems) if anaphylaxis to penicillins - **consult ID; consider allergy assessment.**

Pediatric empiric antimicrobial therapy. Version 3.2 updated October 2015 by the PHSA Antimicrobial Stewardship Program
Approved by: BC Children's Hospital (ID, Micro, All Divisions within UBC Department of Pediatrics)
Reviewed by the Provincial Antimicrobial Clinical Expert Group August 2015

All drugs IV unless stated

Infection	Most likely pathogens	First choice	Penicillin allergy^	Refs**
Dental abscess with fever and/or extensive spread	Viridans streptococci *Peptostreptococcus* spp. *Prevotella* spp. *Porphyromonas melaninogenicus* *Fusobacterium* spp. **Usually polymicrobial**	Amoxicillin-clavulanate PO or Penicillin G + Metronidazole PO	Clindamycin PO/IV	BD FC
Lower respiratory tract				
Community-acquired pneumonia (<1 month)	*Streptococcus agalactiae* (GBS) *Escherichia coli* *Listeria monocytogenes*	Ampicillin + (Gentamicin or Cefotaxime‡)	Cefotaxime‡ + Gentamicin + Vancomycin	BCCH BD
Community-acquired pneumonia (1-3 months)	*Streptococcus pneumoniae* *Streptococcus agalactiae* (GBS) *Staphylococcus aureus* *Escherichia coli* *Chlamydia trachomatis*	Cefotaxime‡ ± Vancomycin ± Clarithromycin PO	Cefotaxime‡ ± Vancomycin ± Clarithromycin PO	BCCH BD
Community-acquired pneumonia (>3 months) - mild	Respiratory viruses *Streptococcus pneumoniae* *Haemophilus influenzae* *Staphylococcus aureus* *Mycoplasma pneumoniae* *Chlamydia pneumoniae*	Amoxicillin PO	Cefuroxime PO	IDSA CPS
Community-acquired pneumonia (>3 months) - moderate		Ampicillin ± Clarithromycin PO ± Oseltamivir PO	Cefotaxime ± Clarithromycin PO ± Oseltamivir PO	AAP IDSA CPS BCCH
Community-acquired pneumonia (>3 months) - severe		Cefotaxime‡ ± Vancomycin ± Clarithromycin PO ± Oseltamivir PO	Cefotaxime‡ + Vancomycin ± Clarithromycin PO ± Oseltamivir PO	IDSA CPS BCCH
Parapneumonic empyema	*Staphylococcus aureus* *Streptococcus pneumoniae* *Haemophilus influenzae*	Cefotaxime‡ ± Vancomycin	Cefotaxime‡ ± Vancomycin	CPS IDSA BCCH
Hospital-acquired pneumonia	*Staphylococcus aureus* *Haemophilus influenzae* *Enterobacter* spp. *Pseudomonas aeruginosa*	(Cefotaxime‡ or Piperacillin-tazobactam) ± Vancomycin*	Cefotaxime‡ ± Vancomycin ± Gentamicin	BCCH IDSA
Aspiration pneumonia	*Staphylococcus aureus* *Haemophilus influenzae* *Enterobacter* spp. Oral anaerobes (see "dental abscess")	Amoxicillin-clavulanate PO or [Cefuroxime PO + (Metronidazole or Clindamycin IV/PO)]	Cefotaxime‡ + Clindamycin IV/PO or [Cefuroxime PO + (Metronidazole or Clindamycin IV/PO)]	Mandell
Cardiac				
Infective endocarditis	Viridans streptococci *Staphylococcus aureus*	As guided by blood culture results **Consult ID & Cardiology**	As guided by blood culture results **Consult ID & Cardiology**	AHA
Genito-urinary tract				
Urinary tract infection (<2 months)	*Escherichia coli* *Klebsiella* spp. *Proteus* spp. *Enterobacter* spp. *Enterococcus* spp.	Ampicillin + Gentamicin Imperative to check blood and CSF cultures. If positive, exit UTI pathway.	Cefotaxime + Gentamicin Imperative to check blood and CSF cultures. If positive, exit UTI pathway.	AAP CPS
Urinary tract infection – mild (≥2 months)	*Escherichia coli* *Klebsiella* spp. *Proteus* spp. *Enterobacter* spp. *Enterococcus* spp. *Staphylococcus saprophyticus* (adolescents)	Cephalexin PO	Cephalexin PO	AAP BD CPS
Urinary tract infection – severe (≥2 months)	*Escherichia coli* *Klebsiella* spp. *Proteus* spp. *Enterobacter* spp.	Cefotaxime ± Gentamicin	Cefotaxime ± Gentamicin	AAP CPS
Pelvic inflammatory disease	*Neisseria gonorrhoeae* *Chlamydia trachomatis* Anaerobic organisms	(Cefixime PO or Ceftriaxone IM) + Doxycycline PO ± Metronidazole PO	(Cefixime PO or Ceftriaxone IM) + Doxycycline PO ± Metronidazole PO	BD BCCDC RB
Intra-abdominal				
Bacterial gastroenteritis	*Salmonella* spp. *Shigella* spp. *Campylobacter* spp. *Escherichia coli* *Plesiomonas shigelloides* *Aeromonas hydrophila*	Treatment not routinely required. If severe then treat according to susceptibilities of organism isolated	Treatment not routinely required. If severe then treat according to susceptibilities of organism isolated	IDSA
Secondary peritonitis *(excluding peritoneal dialysis patients)*	*Escherichia coli* *Klebsiella* spp. *Pseudomonas aeruginosa* *Enterococcus* spp. *Bacteroides fragilis* *Peptostreptococcus* spp.	Piperacillin-tazobactam or Ampicillin + Gentamicin + Metronidazole	Cefotaxime‡ + Metronidazole	IDSA

^Avoid all beta-lactam antibiotics (i.e. cephalosporins, carbapenems) if anaphylaxis to penicillins - **consult ID; consider allergy assessment.**

All drugs IV unless stated

Infection	Most likely pathogens	First choice	Penicillin allergy^	Refs**
Primary peritonitis	*Streptococcus pneumoniae* *Escherichia coli*	Cefotaxime‡	Cefotaxime‡	FC Mandell
Ascending cholangitis	*Escherichia coli* *Klebsiella pneumoniae* *Enterobacter* spp. *Pseudomonas aeruginosa* *Enterococcus* spp. Anaerobic organisms	Ampicillin + Cefotaxime‡ + Metronidazole or Piperacillin-tazobactam	Cefotaxime‡ + Metronidazole ± Vancomycin	FC Long
Antibiotic-associated colitis (*Clostridium difficile* infection)	*Clostridium difficile*	Metronidazole PO ***Stop all other antibiotics if possible***	Metronidazole PO ***Stop all other antibiotics if possible***	BCCH IDSA CPS
Skin and soft tissue				
Cellulitis - mild	*Streptococcus pyogenes* (Group A Strep) *Staphylococcus aureus*	Cephalexin PO ± Trimethoprim-Sulfamethoxazole PO*	Cephalexin PO ± Trimethoprim-Sulfamethoxazole PO*	IDSA CPS
Cellulitis - severe	*Streptococcus pyogenes* (Group A Strep) *Staphylococcus aureus*	Cefazolin ± Clindamycin PO*	Cefazolin ± Clindamycin PO*	IDSA BD
Soft tissue injury - clean	Not infected	Not required	Not required	FC
Dog / cat / human bites - mild	*Staphylococcus aureus* *Streptococcus* spp. *Eikenella corrodens* **(human)** *Pasteurella* spp. **(dog/cat)** *Capnocytophaga cynodegmi* **(dog/cat)** Anaerobic organisms **Usually polymicrobial**	Amoxicillin-clavulanate PO	Clindamycin PO* +Trimethoprim-Sulfamethoxazole PO*	IDSA FC
Dog / cat / human bites - severe	*Staphylococcus aureus* *Streptococcus* spp. *Eikenella corrodens* **(human)** *Pasteurella* spp. **(dog/cat)** *Capnocytophaga cynodegmi* **(dog/cat)** Anaerobic organisms **Usually polymicrobial**	Piperacillin-tazobactam	Clindamycin* +Trimethoprim-Sulfamethoxazole*	IDSA FC Mandell
Necrotising fasciitis (unknown etiology)	*Streptococcus pyogenes* (Group A Strep) *Staphylococcus aureus* Aerobic and Anaerobic organisms **May be polymicrobial**	Piperacillin-tazobactam + Vancomycin + Clindamycin	Ciprofloxacin + Vancomycin + Clindamycin	IDSA FC
Documented group A streptococcal necrotising fasciitis	*Streptococcus pyogenes* (Group A Strep)	Penicillin + Clindamycin	Cefotaxime‡ + Clindamycin	IDSA FC
Musculoskeletal				
Osteomyelitis or septic arthritis (≥3 months)	*Staphylococcus aureus* *Streptococcus pyogenes* (Group A Strep) *Streptococcus pneumoniae*	Cefazolin ± Vancomycin*	Cefazolin ± Vancomycin*	FC Mandell

‡ Cefotaxime may be interchanged with ceftriaxone for children over 30 days old and not on calcium-containing parenteral products (e.g. TPN).

*As anti-MRSA agent. **Current local MRSA rates are available via the hospital antibiogram.** The following factors have been associated with MRSA in previous studies:

- Previous known MRSA infection in child or a significant contact (e.g. family member)
- Family member is a healthcare worker
- First nations child or Pacific Island origin (e.g. Samoan)
- Day care attendance
- Prolonged hospitalization in the last 1 year
- Antibiotic therapy in the last 2 months
- Critically ill
- (Chronic skin condition, e.g. atopic eczema)

**References:

- AAP = American Academy of Pediatrics Guidelines
- BCCDC = BC Centre for Disease Control
- BCCH = Pre-existing BC Children's Hospital Guidelines (sepsis guideline, PICU guideline)
- BD = Bugs & Drugs. Blondel-Hill and Fryters (2012)
- CPS = Canadian Pediatric Society Guidelines
- IDSA = Infectious Diseases Society of America Guidelines
- RB = Red book. American Academy of Pediatrics (2015)
- FC = Textbook of Pediatric Infectious Diseases. Feigin and Cherry, 7th ed. (2014)
- Mandell = Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases, 8th ed. (2015)
- Long = Principles and Practice of Pediatric Infectious Diseases. Long, Pickering and Prober, 4th ed. (2012)

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