ANTIMICROBIAL GUIDELINES FOR PAEDIATRICS FY2024

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INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
CARDIOVASCULAR SYSTEM						
Infective Endocarditis see European Heart Journal 2023; 1–95; Circulation 2015;132:1487. Use in conjunction with "Baby Bear Infective Endocarditis" notes						
Native valve	Streptococci (Viridans & other nutritional variants), *S. aureus* (more common in neonates, IV drug users, presence of indwelling catheters), Enterococci, HACEK organisms	((IV Penicillin G 200,000 units/kg/day Q6H (preferred) OR IV Ampicillin 300mg/kg/day Q6H (if unable to tolerate penicillin e.g. phlebitis) PLUS IV Cloxacillin 200mg/kg/day Q6H) WITH/WITHOUT IV Gentamicin 3mg/kg/day Q8-24H)	(IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H WITH/WITHOUT IV Gentamicin 3mg/kg/day Q8-24H)	Continue IV antibiotics at least 4 weeks. Stop Vancomycin (if used) if no evidence of resistant Staph. or enterococci.	**Native valve:** 4-6wk (duration of Gentamicin may vary, refer ID)	Refer ID. See "Infective Endocarditis" section in Baby Bear for diagnostic issues, complications, & indications for surgery. >3 separate sets of blood cultures separated by time & location are required; inform laboratory if unusual organisms suspected. Shorter regimens not recommended if clinical symptoms >3 mth, extracardiac focus of infx, intracardiac abscess, mycotic aneurysm. Enterococci inherently resistant to cephalosporins despite in vitro testing. NB: beta-lactams clinically superior to glycopeptides for beta-lactam-sensitive organisms.
Prosthetic devices/ valve	As Above & CoNS, uncommonly Candida, GBS, Strep. pneumo	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H PLUS IV Gentamicin 3mg/kg/day Q8-24H WITH/ WITHOUT PO Rifampicin 20mg/kg/day Q8-12H (if prosthetic device/ Staph proven)		Continue IV antibiotics at least 6 weeks. Stop Vancomycin (if used) if no evidence of resistant Staph. or enterococci	≥6wk (Vanco, Rif) 2wk (Genta)	

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		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
CARDIOVASCULAR SYSTEM						
Pre-exposure Prophylaxis (see Appendix 1: "Antibiotic Prophylaxis for Infective Endocarditis" below) (see European Heart Journal 2023; 1–95 Circulation. 2021;143 :e963–e978; JAC Antimicrob Resist 2022:19;4(3); Journal of Dental Research 2019;98(10) 1081-1087; J Antimicrob Chemother 2015; 70: 2382–2388)	Streptococci (Viridans & other nutritional variants), *S. aureus,* Enterococci	PO Amoxicillin 50mg/kg/dose (max 2g) (preferred) OR IV Ampicillin 50mg/kg/dose (max 2g) (preferred if unable to tolerate PO) OR PO Cephalexin 50mg/kg/dose (max 2g) (if intolerant to amox/ ampi, but not allergic) OR IV Cefazolin 50mg/kg/dose (max 1g) (if penicillin allergy suspected but non-anaphylactic/ severe)	PO Clarithromycin 15mg/kg/dose (max 500mg) (preferred, unless cardiac risk factors present*) OR PO Doxycycline 2-3mg/kg/dose (if ≥8yo, or presence of risk factors* e.g. congenital long QT syndrome, or on multiple QT-prolonging drugs; max 100mg)	NA	1 dose	For oral prophylactic antibiotics (e.g.: dental/ minor procedures), give 1h before surgery. For IV prophylactic antibiotics (major procedures), to give 30min before surgery **Clindamycin may cause more severe reactions *(e.g. C difficile* infections) hence not recommended. Resistance rates of VGS to macrolides higher but may be still be effective as prophylaxis (low-magnitude, transient exposure) if no suitable options available.**

APPENDIX 1: ANTIBIOTIC PROPHYLAXIS FOR PREVENTION OF INFECTIVE ENDOCARDITIS

	CARDIAC CONDITIONS	TYPES OF PROCEDURES	

Recommended	• Prosthetic cardiac valve or prosthetic material used for cardiac valve repair
	• Previous infective endocarditis
	• Certain congenital heart disease (CHD)*
	  ○ Unrepaired cyanotic CHD
	  ○ Cyanotic CHD with palliative shunts and/or conduits
	  ○ Complex intracardiac repair of CHD
	  ○ Repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure
	  ○ Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibit endothelialisation), by cardiac surgery or percutaneous technique
	• Cardiac transplantation recipients who develop cardiac valvulopathy
		• Dental procedures
		  ○ All dental procedures requiring manipulation of the gingival or periapical region of the teeth or perforation of the oral mucosa
		• Respiratory tract procedures
		  ○ Invasive procedure of the respiratory tract that involves incision or biopsy of the respiratory mucosa, such as tonsillectomy and adenoidectomy
		  ○ Invasive procedure to treat an established infection, such as drainage of drainage of an abscess or empyema
		• Procedures involving infected skin, skin structure, or musculoskeletal tissue	

Reasonable	• Left-sided valvular lesions
	  ○ Aortic stenosis
	  ○ Aortic regurgitation
	  ○ Mitral stenosis
	  ○ Mitral regurgitation
	• Patients who have previously received antibiotic prophylaxis, and who would like to continue having it, despite the rationale for the change in policy has been fully explained (even though lesion may not be part of the list of cardiac conditions listed above)
		• As Above	

Not Recommended	• Any other form of CHD except for the conditions listed in 'Recommended'	• Dental procedures
		  ○ Routine anaesthetic injections through non-infected tissue
		  ○ Treatment of superficial caries
		  ○ Placement of removable prosthodontic or orthodontic appliances
		  ○ Removal of sutures
		  ○ Dental x-rays
		  ○ Shedding of deciduous / primary teeth
		  ○ Trauma to the lips or oral mucosa
		• Respiratory tract
		  ○ Endotracheal intubation
		  ○ Bronchoscopy
		  ○ Tympanostomy tube insertion
			• Gastrointestinal or genitourinary tract procedures (unless there is an established infection)
			• Skin and soft tissue – any procedure on non-infected tissue
			• Others
			  ○ Cardiac catheterisation , including balloon angioplasty
			  ○ Implanted cardiac pacemakers, implanted defibrillators, and coronary stents
			  ○ Incision or biopsy of surgically scrubbed skin
			  ○ Circumcision
			  ○ Vaginal or Caesarean delivery

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
CENTRAL NERVOUS SYSTEM						
Brain Abscess (non-shunt related) see Semin Pediatr Infect Dis 2003;14:108 & Neurosurg Focus 2008;24(E8):1						
Primary or Contiguous Source (e.g. Sinusitis, Otitis Media or Mastoiditis)	Streptococci, GNB (enteric), Bacteroides, *S. aureus,* uncommonly Pseudomonas; rarely Listeria/ Nocardia	(IV/ IM Ceftriaxone 100mg/kg/day Q12-24H PLUS IV Metronidazole 30mg/kg/day Q6H) WITH/ WITHOUT IV Cloxacillin 200mg/kg/day Q6H	IV Meropenem 120mg/kg/day Q8H WITH/ WITHOUT IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H (ID Consult required for other combinations)	Continue IV antibiotics at least 42d, stop Vanco (if used) if no evidence of MRSA	≥ 42 IV to PO switch: not encouraged	Lesions <2.5cm may not require drainage. Use ceftazidime instead of ceftriaxone if 2o to otitis externa. Staph. aureus rare without positive blood cultures, endocarditis or trauma/ surgery.
Traumatic	*S. aureus,* GNB (enteric), Streptococci	IV Cloxacillin 200mg/kg/day Q6H PLUS IV/ IM Ceftriaxone 100mg/kg/day Q12-24H	IV Meropenem 120mg/kg/day Q8H WITH/ WITHOUT IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H	As above	≥ 42 IV to PO switch: not encouraged	NA
Post-surgical	Staphylococci (CoNS or aureus), GNB (enteric), Pseudomonas	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H Q6H PLUS IV/ IM Ceftazidime 150mg/kg/day Q8H	IV Meropenem 120mg/kg/day Q8H PLUS IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H	As above	≥ 42 IV to PO switch: not encouraged	Consider hospital acquired GN bacilli (may be multi-resistant), ID consult may be needed.
Encephalitis/ Meningoencephalitis see CID 2008;47:303 & Lancet ID 2010;10:835, JPIDS 2013;2(2):179						
Immune competent (no travel)	HSV, VZV, EBV, HHV 6/7, EV, Parecho, Adeno, Influenza, MTB, Mycoplasma, ADEM, anti-NMDAr, causes of bac. meningitis; rarely Dengue, Bartonella, Toxo, Rickettsia etc.	(IV Acyclovir* PLUS IV/ IM Ceftriaxone 100mg/kg/day Q12-24H) WITH/ WITHOUT IV Ciprofloxacin 30mg/kg/day Q8H WITH/ WITHOUT IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H ***IV Acyclovir Dosing:** < 3 mth: 60mg/kg/day Q8H 3mth–12yo: 45mg/kg/day Q8H ≥12yo: 30mg/kg/day Q8H	IV Acyclovir* PLUS IV Levofloxacin ID 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo) (Consider up-front therapy for influenza, MTB, herpesviridae if epidemiologic/ lab features suggestive)	Continue IV Ceftriax at least 5-10d. Stop Acyclovir if no evidence of HSV. Stop Ciprofloxacin if no evidence of Mycoplasma +/- Rickettsia. Stop Vanco (if used) if no evidence of MRSA	HSV/ VZV/ EBV: 21 Mycoplasma: 14-21 TB: 12-18 mth Bacterial: 5-21 IV to PO switch: not encouraged	Dose acyclovir according to ideal body weight in obese patients. Consider autoimmune causes. Consider mumps/ measles during outbreaks. Specific Rx heavily influenced by imaging, laboratory results.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Encephalitis/ Meningoencephalitis (cont'd)						
Immune competent (with travel)	As Above & JE, WNV, Rabies, Nipah, Crypto, amoebic, TBE, etc.	As Above; additional Rx depends on exposure, availability of therapy	As Above	As Above	≥ 10-21 IV to PO switch: not encouraged	Many possibilities depending on geography, exposure
Immune compromised	As Above & CMV, HIV, JC, Listeria, LCMV, Candida, Crypto, Aspergillus, Nocardia, PRESS etc.	As Above WITH/ WITHOUT IV Ampicillin 400mg/kg/day Q6H WITH/ WITHOUT IV Ambisome 5mg/kg/day Q24H	IV Acyclovir* PLUS IV Meropenem 120mg/kg/day Q8H WITH/ WITHOUT IV Ciprofloxacin 30mg/kg/day Q8H WITH/ WITHOUT IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H WITH/ WITHOUT IV Ambisome 5mg/kg/day Q24H	As Above; stop Ampicillin if no evidence of Listeria, stop Ambisome if no evidence of fungal infection	As Above	Opportunistic & hospital acquired pathogens more likely. Reduction of immunosuppression crucial for Rx. Biopsy may be essential for diagnosis.
Meningitis see Clin Microbiol Infect 2016; 22: S37–S62; Paediatr Child Health Vol 19 No 3 March 2014; Redbook 2021. **Goal is empiric therapy with CSF examination within 30min before or 2h after; do not delay empiric therapy for CT/ LP.** Empiric recommendations have been made including consideration for viral meningitis. For immune compromised patients see above.						
Age <1mth	GBS, Listeria, *E. Coli* (& other GNB including Salmonella), HSV, EV	(IV Ampicillin PLUS (IV Gentamicin OR IV Cefotaxime OR IV/ IM Ceftriaxone* 100mg/kg/day Q12-24H)) WITH/ WITHOUT IV Acyclovir	((IV Meropenem OR PO Chloramphenicol 100mg/kg/day Q6H (Not available in KKH)) PLUS IV Bactrim (TMP) 20mg/kg/day Q6H)) WITH/ WITHOUT IV Vancomycin WITH/ WITHOUT IV Acyclovir	Consider risk factors & signs for bacterial meningitis, if present, continue Ampi 14d, Genta 7d	GBS: 14-21 Listeria, GNB: 21; HSV: 21 IV to PO switch: not encouraged	**See Appendix 7 for neonatal dosing.** *Use ceftriaxone if PMA ≥41 weeks, or if <28d & no hyperbilirubinemia. For confirmed GBS, use higher ampicillin doses. For gentamicin, use longer intervals if concerned re: oliguria. Use acyclovir if there are risk factors or clinical features of HSV or encephalopathic and/ or age <3wk. Monitor OAE/ development. NB: For neonatal HSV, recommend prophylaxis with PO Acyclovir for 6 months after completion of treatment.
Age 1-3mth	Includes org. in both <1 mth and >3 mth age group			Consider risk factors & signs for bacterial meningitis, if present, continue IV Ceftriax 5-10d	5-21 IV to PO switch: not encouraged	

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		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Meningitis (cont'd)						
Age >3mth (see Infection and Drug Resistance 2020:13 4077–4089; Clin Microbiol Infect 2016; 22: S37–S62; Paediatr Child Health Vol 19 No 3 March 2014; Red Book 2021)	*S. pneumoniae* (SPn), *H. influenzae* type b, N. meningitidis, EV, HSV, rarely Salmonella, drugs (IVIG, NSAIDs, Bactrim etc.), Mollaret"s	IV/ IM Ceftriaxone 100mg/kg/day Q12-24H WITH/ WITHOUT IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H WITH/ WITHOUT IV Acyclovir * ***IV Acyclovir Dosing:** < 3 mth: 60mg/kg/day Q8H 3mth-12yo: 45mg/kg/day Q8H ≥12yo: 30mg/kg/day Q8H	IV Levofloxacin$_{ID}$ 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo) WITH/WITHOUT IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H WITH/ WITHOUT IV Acyclovir*	Consider risk factors & signs for bacterial meningitis, if present, continue IV Ceftriax 5d (use Bacterial Meningitis Score or Meningitest)	Neiss: 5-7 Hib: 7-10 SPn: 10-14 HSV: 14-21 Salmonella: 28-42 IV to PO switch: not encouraged	Give dexamethasone 0.2mg/kg/dose Q8H with 1st dose antibiotic if bacterial meningitis suspected, continued if Hib positive for 2-4d (evidence for SPn weaker). Add vancomycin if Gram stain shows GPC in pairs, or very ill. Use acyclovir if there are risk factors or clinical features of HSV. If highly non-susceptible SPn isolated, consider levofloxacin or linezolid. Monitor OAE/ cognition.
Meningitis, eosinophilic (see Clin Microbiol Rev 2009;22:322; CID 2009;48:322; Am J Trop Med Hyg 74(6), 2006, J Travel Med 2007; 14: 407–410 *)	*Angiostrongylus cantonensis, Gnathostoma, Baylisascaris*	PO Prednisolone 1-2mg/kg/day Q12-24H (max 60mg/day) WITH/ WITHOUT (PO Albendazole 30mg/kg/day Q12H OR PO Mebendazole 10mg/kg/day Q12H (up to 400mg/day) (non-formulary))	NA	NA	14-21	Value of antihelminthic therapy in conjunction with corticosteroids not fully established
(Specific organisms, Post-exposure Prophylaxis)	*H. influenzae* type b	PO Rifampicin: Q24H <3mth: 10mg/kg/day 3mth- 12yr: 20mg/kg/day >12yr: 600mg/day	NA	NA	4	All household contacts
	N. meningitidis	PO Rifampicin: Q12H <1mth: 5mg/kg/dose >1mth: 10mg/kg/dose (up to 600mg)	IM Ceftriaxone x1 (if no beta-lactam allergy): <15yr: 125mg, >14yr: 250mg OR PO Ciprofloxacin 500mg x1 (adults)	NA	2 (Rifampicin)	All household contacts & HCW with unprotected direct droplet exposure within 24h of effective index case Rx.

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		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
CNS Device/ post-neurosurgical/ head trauma infections see CID 2017; 64(6): e34-65, J Neurosurg Pediatr 2014; Suppl 1: 60-71						
(Includes possible EVD/ CSF shunt infections)	Staphylococci (CoNS or aureus), *Cutibacterium acnes*, GNB (including *Pseudomonas* spp.), rarely: *Corynebacterium* spp.	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H PLUS IV/ IM Ceftazidime 150-200mg/kg/day Q8H [Consult ID if intrathecal Rx required]	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H PLUS IV Meropenem 120mg/kg/day Q8H [Consult ID if intrathecal Rx required]	Continue IV antibiotics at least 7d	(Days after sterile CSF) CoNS/ *C. acnes*: 7-10 *S. aureus*: 10-14 GNB: 10-14 (up to 21d – experts' opinion) IV to PO switch: not encouraged	**See Appendix 7 for neonatal dosing.** For CNS device infections: 1) remove device or externalize distal end, 2) IV antimicrobials, 3) sample CSF regularly, 4) replacement after infection fully controlled. Timing of shunt replacement: depends on microbial etiology & clinical/ microbiological response, usually 3-10d after sterile CSF (see CID 2017). Intraventricular/ intrathecal antibiotics may be necessary in specific infections. Refer ID and see Appendix 2 on "Intraventricular/ Intrathecal Antibiotics".

APPENDIX 2: INTRAVENTRICULAR/ INTRATHECAL ANTIBIOTICS see NEJM 2010;362:146

Please refer to specific guidelines for administration and therapeutic drug monitoring guidelines.

	GENTAMICIN	AMIKACIN	VANCOMYCIN
General information	• Patient should be continued on parenteral (IV) therapy. • Central nervous system (CNS) penetration of IV aminoglycosides and vancomycin is poor and intraventricular concentrations may be undetected despite therapeutic plasma concentrations. (CNS penetration is only 20% to 30% even in inflamed meninges for vancomycin) • An estimation of patient's cerebrospinal fluid volume should be done by the neurosurgeon before initiation of therapy.		
Usual initial dose	**1mg of gentamicin every 24 hours** (infants and children) **Note:** • A range of 0.5 to 2 mg/day have been used in the paediatric population. • The MIC of the infecting organism in the CSF should be assessed and if necessary, the dose can be increased up to 5mg daily. • Doses of 4 to 8 mg have been used in adults.	Intraventricular/Intrathecal Amikacin dose = **estimated CSF volume (ml) X 0.1mg/ml** **Note:** • 0.1mg/ml is based on an MIC of <10mcg/ml. • Higher levels may be needed for more resistant micro-organisms. Please consult the ID physician or the pharmacist if in doubt.	**5mg of vancomycin every 24 hours** (infants and children) **Note:** • A range of 5 to 20mg/day have been used in paediatric population. • 5mg/day may be adequate for neonates while children >25kg may require at least 20mg/day. • The MIC of the infecting organism in the CSF should be assessed and if necessary, the dose can be increased.
Possible side effects	• Ototoxicity, seizures, CNS abnormalities, aseptic meningitis, CSF eosinophilia and symptomatic CSF inflammation. • Most of the neurologic symptoms and white cell abnormalities resolved in most patients after discontinuation of gentamicin based on case reports.	• Ototoxicity, seizures, CNS abnormalities, aseptic meningitis, CSF eosinophilia and symptomatic CSF inflammation. **Note:** • This product contains sodium metabisulfite/ sulfite which may cause allergic type reactions in susceptible people. The prevalence of sulfite sensitivity in the general population is unknown and probably low. • Sodium metabisulfite (preservative) is potentially neurotoxic when given intraventricularly/ intrathecally based on animal studies but not documented in human studies to date. • **Physicians will need to discuss with parents/caregiver before starting therapy .**	• Ototoxicity, ataxia, motor weakness, seizures, CSF eosinophilia and local tissue irritation.
Monitoring parameters	• A baseline hearing test is recommended before initiating therapy. Repeat hearing test in 3 months' time. • If the patient is on concurrent systemic therapy (of the same antibiotic), do a baseline renal panel and monitor renal function at least once a week. • Monitor clinical status of patient, including neurological symptoms, and look out for any signs of ototoxicity. • Monitor daily EVD or drain site output.		

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		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
DENTAL/ORAL & ENT						
Dental see Acad Ped Dentistry 2020; 443 – 6, Belgian KCE 2020: Reports 332. Refer Dental. Consider non-dental causes (i.e. cervical lymphadenitis, parotitis) for facial swelling/ cellulitis.						
Gingivitis	Streptococcus *spp.* (esp *Strep. Anginosus* group) and anaerobes (anaerobic *Streptococci, Prevotella*, and *Fusobacterium* spp.,*Porphyromonas gingivalis*) -	No antibiotics required. Consider Chlorhexidine gargle, analgesia/ anti-inflammatory.		NA	NA	Limited evidence that antibiotics reduces pain, or analgesia use. See section below on "Herpes gingivostomatitis" if this is clinically suspected. Antibiotics unlikely to penetrate adequately to desired site (pulpal tissue), especially with limited vascular supply due to abscess/ pus formation. If systemic signs of infection (T>38, malaise, cellulitis, lymphadenopathy etc) develop following adequate endodontic Rx, antibiotics e.g. PO Amoxicillin/ Clav (or PO Clindamycin if severe penicillin allergy) for 3 -7d may be considered
Pulpitis/ Pulp necrosis (see JADA 2019; 150(11): 906-21; Cochrane Database Syst Rev 2019; 5: CD00496; AAE Guidance 2020; Med Oral Patol Oral Cir Bucla 2004; 9: 363-76; SDCEP Guidelines 2016)		No antibiotics required. For pulpitis, consider immediate surgical intervention (pulpectomy, pulpotomy or extraction).				
Symptomatic apical periodontitis/ Localized abscess (apical, periapical, periodontal) (see JADA 2019; 150(12): E179-216; JADA 2019:150(11):906-921; AAE Position Statement 2017)		No antibiotics required. Drainage, root canal treatment, pulpectomy is 1st line.				

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Dental (cont'd)						
Odontogenic abscess/ Facial cellulitis of odontogenic origin (see AAPD 2020; 443-6; Arch Argent Pediatr 2018;116(4):e548-e553; EAPD 2002)	Streptococcus *spp.* (esp *Strep. Anginosus* group) and anaerobes (anaerobic *Streptococci, Prevotella*, and *Fusobacterium* spp.,*Porphyromonas gingivalis*).	**If severe/ systemic signs of infection*:** PO Amoxicillin/ Clav (Amox) 50mg/kg/day Q12H OR IV Amoxicillin/ Clav. 120mg/kg/day (Amox:100mg/kg/day) Q8H (IV if toxic/ unable to tolerate PO)	**If severe/ systemic signs of infection*:** PO/IV Clindamycin 30mg/kg/day Q8H OR PO/ IV Metronidazole 30mg/kg/day Q8H (IV if toxic/ unable to tolerate PO)	Continue antibiotics at least 3d. Review at D3, if clinical resolution/ infection expected to resolve, stop antibiotics.	3-7	Surgical intervention (e.g. dental drainage, root canal cleaning etc) recommended. *Consider abx if severe/ systemic signs of infection e.g. T>38, malaise, spread to deep fascial spaces, upper airway involvement, dysphagia, dyspnea, and/or trismus, or immunocompromised.
Periodontal diseases (i.e. aggressive periodontitis, necrotizing ulcerative periodontitis/ gingivitis etc). (see J Clin Periodontol 2020;47;22: 257-81; J Clin Periodontol 2015; 42:647–57; J Trop Ped 2016:1-7; Antibiotics (Basel) 2018;7(2):38)	Streptococcus *spp.* (esp *Strep. Anginosus* group) and anaerobes (anaerobic *Streptococci, Prevotella*, and *Fusobacterium* spp.,*Porphyromonas gingivalis*).					Usually associated with risk factors such as immune-compromised (e.g. HIV), severe malnutrition, poor oral hygiene, smoking. Debridement, and root planning is 1st line; for aggressive periodontitis, antibiotics as adjunct to surgical procedure showed probing pocket depth (PPD) reduction, and improvement in clinical attachment level (CAL) at 6th and 12th month.
Replantation of avulsed permanent dentition (see Dent Traumatol 2009; 25: 158-64; Dent Traumatol 2020; 36: 331-342; BPSD Avulsion Guidelines 2017)	-	PO Amoxicillin 50mg/kg/day Q8-12H	PO Doxycycline 4mg/kg/day Q12H (max 100mg/dose) (preferred if ≥ 8 yo) OR PO Clindamycin 30mg/kg/day Q8H (preferred if < 8yo)	NA	4-7	Periodontal healing dependent on the root maturity (open vs closed pex), and periodontal ligament condition (i.e. extra-oral dry time). Abx use not associated with improved tooth survival or periodontal healing but may be considered as bacterial contamination may have occurred extraorally and intraorally. Consider Tdap booster especially if environmental contamination.

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		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Oral Cavity						
Acute bacterial suppurative parotitis see J Oral Maxillofac Surg 2002; 60(4);446-8; J Craniofacial Surg 2003; 14(1): 37-40; Am Fam Phy 2014; 89(11): 882-888	Most commonly *S. aureus,* and oral anaerobes. Less common, Streptococci, gram-negative org, NTM and *Actinomyces* spp.	PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H	PO Clindamycin 30mg/kg/day Q8H	NA	7-14 (often longer if actinomyces/ NTM confirmed/ presumed)	Usually unilateral, must be differentiated from viral parotitis (mumps), which usually produces no pus. Predisposing conditions: dehydration, malnutrition, immune-suppression, tracheostomy, ductal obstruction, sialectasis, and medications that suppress salivary flow. Consider surgical drainage if abscess.
Herpes gingivostomatitis see Red Book 2018	Herpes simplex virus (usually HSV-1)	Primary infection (non-immunocompromised), or immunocompromised: PO Acyclovir 80mg/kg/day Q6H (max 800mg/dose)	Primary infection (non-immunocompromised), or immunocompromised: PO Valacyclovir 40mg/kg/day Q12H (max 1000mg/dose)	NA	5-7 (primary/ non-immunocom) 7-10 (immunocom)	Self-limiting, oral acyclovir may help shorter duration of symptoms. No role for antibiotics or topical acyclovir 5% (cold sore) cream. May send vesicle fluid/ ulcer swab for HSV PCR.
Oropharyngeal Candidiasis see Clin Infect Dis 2016; 62(4): e1-50	Mostly *Candida albicans* (although *C. glabrata, C. dubliniensis*, and *C. krusei* have been described)	Mild: Topical Miconazole 2% oral gel 1 app QDS OR PO Nystatin suspension: <1 mth: 100,000 units Q6H 1 mth – 1yr: 200,000 units Q6H >1 yr: 400,00 – 600,000 units Q6H	Moderate – severe: PO Fluconazole 3-6mg/kg/day Q24H (max 400mg) (preferred) OR PO Itraconazole 5mg/kg/day Q12H (max 200-400mg/day) (if fluconazole-refractory)	NA	7-14	Typically occurs with HIV, DM, malignancies, radiation therapy, steroids, antimicrobials, and denture use. Can develop infrequently in very young infants with poor oral hygiene and bottling to sleep due to milk residues on tongue. Occurrence could be an indicator of immune dysfunction, consider screening for immunodeficiency.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Cold sore (Herpes labialis) see Red Book 2021; Arch Dermatol 2001; 137(9):1232-5; Arch Intern Med 2008; 168(11): 1137-44						
Treatment	Herpes simplex virus (usually HSV-1)	Mild/ immunocompetent: Topical Acyclovir 5% (cold sore) cream 1 app 5x/day	Severe/ immunocompromised: PO Acyclovir 80mg/kg/day Q6H (max 800mg/dose)	NA	4 (Topical) 5-10 (PO)	Topical acyclovir may not be as effective due to poor penetration of drug to site of viral replication. Oral acyclovir, if initiated early during prodromal phase (within 48H), may reduce the time of crust by 1 day, duration of pain and healing time.
Recurrent (Prophylaxis)	Herpes simplex virus (usually HSV-1)	PO Acyclovir 20mg/kg/dose Q12H (max 800mg/dose)	NA	NA	6-12mths	Risk factors: intense sunlight exposure, stress. May consider in patients with recurrent infections (≥6x/year), or symptoms/episodes causing distress. Reassess the need for continued suppressive therapy periodically (at 6 months).

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Ear						
Perichondritis/ Chondritis **- non-toxic**	Mainly *P. aeruginosa,* less commonly *S. aureus and Streptococcus spp.*	PO Ciprofloxacin 30mg/kg/day Q12H	*Refer ID/Allergy	NA	7-14 IV to PO switch: after 2-3d & patient better	Can occur after trauma, burns, surgery, ear piercing and acupuncture. Presents as painful swelling, warmth and erythema in the auricle. If abscess present, will require I&D as cartilaginous portion of the ear is less vascularized. Send samples of pus for culture.
- toxic (see BMJ 2001;322:906, Am Fam Physician 2005;72:2029)		IV Ceftazidime 150mg/kg/day Q8H	IV Ciprofloxacin 30mg/kg/day Q8H	Continue IV antibiotics at least 2-3d, then PO Ciprofloxacin		
Diffuse Acute Otitis Externa **- non-toxic, non-severe**	*S. aureus, Pseudomonas aeruginosa* (more common in "Swimmer's ear")	Analgesia, Aural toilet PLUS (Polydexa (Polymyxin B, neomycin, dexamethasone) OR Dextracin (Neomycin, dexamethasone) OR Sofradex (Framycetin 0.5%/ dexamethasone 0.05%/ gramicidin 0.005%) ear drops 3* drops TDS OR Ciprofloxacin 0.3% 3* drops TDS (non-intact tympanum))		NA	7	Ear wick useful. Advise abstinence from water sports for 7-10d. Malignant otitis externa rare in children, systemic Rx required, consult ENT/ ID. Avoid neomycin/ aminoglycoside containing ear drops if tympanic membrane is not intact.
- non-toxic, severe (see PIDJ 2003;22:299, Otolaryngol Head Neck Surg 2006) *J Speech Hearing Research 1992;35:93		PO Cloxacillin 50mg/kg/day Q6H	PO Erythromycin 50mg/kg/day Q6H			
Malignant External Otitis	Mainly *P. aeruginosa*	IV Piperacillin/ Tazo. (Pip) 300mg/kg/day Q8H	IV Meropenem 60mg/kg/day Q8H OR IV Ciprofloxacin 30mg/kg/day Q8H	NA	≥28	Risk groups: immunocompromised/ received chemotherapy, diabetes mellitus, AIDS. Debridement usually required. Treat for 4-6 weeks if bone involved.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	**Alternative therapy** (if severe allergy to first-line/ penicillin)			
Acute Otitis Media - non-toxic	*S. pneumoniae*, *H. influenzae*, *M. catarrhalis,* Group A streptoccocus, viruses; less commonly *S. aureus*	PO Amoxicillin 80-90mg/kg/day Q12H (preferred) OR PO Amoxicillin/ Clav. (Amox) 80-90mg/kg/day Q12H OR PO Cefuroxime 30mg/kg/day Q12H* (*If no response to at least 2d of high dose Amox and 2d of Amox/ Clav.) OR PO Cefaclor 40mg/kg/day Q12H	PO Levofloxacin[ID] 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo)	NA	<2yr: 10 >2yr: 7 (Ceftriax: 3)	If >2yr & no severe otalgia, may observe & give analgesia alone for 48h (60-75% resolve). Must reassess in 2-3d for response to initial Mx, escalate Rx if not better. If still not better by 10d, consider tympanocentesis. If dose volume of PO Amox suspension for Q12H dosing is large and intolerable, consider Q8H.
Acute Otitis Media - toxic (see Pediatrics 2004;113:1451 , JAMA2010;304:2161 & NEJM 2011;364:105; IJID 2003; 7:S21-26; PIDJ 2008; 27: 483-489)		IV/ IM Ceftriaxone 50mg/kg/day Q12-24H	IV Levofloxacin[ID] 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo)			

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Otitis Media with Effusion (OME) (see Otolaryngology 2016; 154(1S): S1-41; Cochrane 2016, 6: CD009163; Eur Ann Otorhinolaryngol 2018; 134: S33-9)	As above *(if infected, treat as acute otitis media)*	No Antibiotics required.	NA	NA	NA	Presence of fluid in the middle ear w/o ss/x of infection; tympanic membrane may be normal. May occur during URTI, or as an inflammatory response following AOM. Most resolve within 3mth. Rx NOT recommended as moderate benefits outweighed by adverse events, resistance, and no additional benefit on hearing loss/ need for surgery. Consider insertion of tympanostomy tubes +/- adenoidectomy if: chronic OME with hearing difficulty; recurrent AOM with OME; chronic OME with sx (vestibular, behavioural, ear discomfort, reduced QoL); or at-risk for development difficulties. Topical intranasal corticosteroids, antihistamine/ decongestant may be useful if concomitant AR.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Acute Mastoiditis - non-toxic	*S. pneumoniae*, *H. influenzae*, *M. catarrhalis,* Group A streptoccocus, *S. aureus*	IV Amoxicillin/ Clav. 120mg/kg/day (Amox:100mg/kg/day) Q8H PLUS IV Ampicillin 100mg/kg/day Q6H	IV/ IM Ceftriaxone 100mg/kg/day Q12-24H	Continue IV antibiotics at least 5-7d; stop Vancomycin (if used) if no evidence of MRSA	≥21-28 IV to PO switch: after 5-7d & patient better	Rarely, very well children can be Rx as outpatient with high dose PO Amox/ Clav. Rx as for brain abscess if there is intracranial extension. Myringotomy +/- mastoidectomy necessary.
Acute Mastoiditis - toxic (see Int J Pediatr Otorhinolaryngol 2000;56:33)	*S. pneumoniae*, *H. influenzae*, *M. catarrhalis,* Group A streptoccocus, *S. aureus*	IV/ IM Ceftriaxone 100mg/kg/day Q12-24H PLUS IV Clindamycin 40mg/kg/day Q6H	IV Meropenem 60mg/kg/day Q8H WITH/ WITHOUT IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H	Continue IV antibiotics at least 5-7d; stop Vancomycin (if used) if no evidence of MRSA	≥21-28 IV to PO switch: after 5-7d & patient better	Rarely, very well children can be Rx as outpatient with high dose PO Amox/ Clav. Rx as for brain abscess if there is intracranial extension. Myringotomy +/- mastoidectomy necessary.
Perichondritis/ Chondritis (see BMJ 2001;322:906, Am Fam Physician 2005;72:2029)	Mainly *P. aeruginosa,* less commonly *S. aureus and Streptococcus spp.*	IV Ceftazidime 150mg/kg/day Q8H	IV Ciprofloxacin 30mg/kg/day Q8H	Continue IV antibiotics at least 2-3d, then PO Ciprofloxacin 30mg/kg/day.	7-14 IV to PO switch: after 2-3d & patient better	Can occur after trauma, burns, surgery, ear piercing and acupuncture. Presents as painful swelling, warmth and erythema in the auricle. If abscess present, I&D recommended as cartilaginous portion of the ear is less vascularized. Send samples of pus for culture.
Nose see PIDJ 1993;12:115 & Arch Dis Child 1998;79:225						
Acute Rhinitis (see sinusitis as well)	Respiratory viruses	No Antibiotics required; Decongestants, Antihistamines (pref. >2y)	NA	NA	NA	Mucopurulent discharge common in viral rhinitis & NOT an indication for antibiotics. However, chronic purulent rhinitis suggests foreign body or sinus involvement.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Pharynx						
Pharyngo-tonsillitis (see: CDC Clinical Guidance for Group A Strep Pharyngitis 2024; Cochrane Database Rev 2021; 3(3): CD004406; Eur J Pediatr 2023; 182(12); 5259-73; Red Book 2021-4; CID 2012; 55(10): e86-102)	Respiratory viruses (esp <3yo), EBV	No Antibiotics required		NA	NA	Gp A Strep pharyngitis uncommon in children <3yo. Viral pharyngitis more common especially in presence of other signs/ symptoms such as: rhinorrhea, cough, oral ulcers, and/or hoarseness.
	Group A, C, G Streptococcus, Mycoplasma	(Only if suspect Gp A Strep) PO Penicillin V 50mg/kg/day Q6-8H OR PO Amoxicillin 50mg/kg/day Q8-12H OR IM Benzathine Penicillin G ≤27kg: 600,000 units x1 dose >2kg: 1.2 million units x1 dose	PO Cefuroxime 30mg/kg/day Q12H (if penicillin allergy suspected, but non-anaphylactic/ severe) OR PO Clarithromycin 15mg/kg/day Q12H* OR PO Clindamycin 30mg/kg/day Q8H* *(*worsening resistance rate limits usefulness)*	NA	10 (Pen V, Amox, Cefurox, Clinda, Clarithro) 1 dose (IM Benzathine Pen G)	Consider use of modified Centor score for Gp A Strep pharyngitis (esp. exudate or swelling on tonsils, absence of cough, tender lymphadenopathy, temp >38 deg), age >3yr to guide necessity for antibiotics.
Epiglotittis (see Arch Dis Child 1994;70:129)	*H. influenzae*, Group A streptococcus, *S. pneumoniae*, *S. aureus*	IV Amoxicillin/ Clav. 120mg/kg/day (Amox: 100mg/kg/day) Q8H OR IV/ IM Ceftriaxone 50mg/kg/day Q12-24H	IV Meropenem 60mg/kg/day Q8H OR PO Chloramphenicol 100mg/kg/day Q6H	Continue IV antibiotics at least 5d if immunized against Hib	5-10 Hib: 2-5 IV to PO switch: after 5d & patient better	**Do not disturb child, assume position of comfort**. Oxygen, vital signs, IV access are secondary to urgent ENT, anaesthetist, intensivist consult to secure airway.
Membranous pharyngitis ± Jugular Vein septic phlebitis (Lemierre's) (see Clin Microbiol Rev 2007;20:622)	Fusobacterium necrophorum, other co-infecting oral flora (possible contributory role of EBV, steroids)	IV Ceftriaxone 100mg/kg/day Q12-24H PLUS IV Metronidazole 30mg/kg/day Q6H	(IV Clindamycin 40mg/kg/day Q6H PLUS IV Metronidazole 30mg/kg/day Q6H) OR IV Meropenem 60mg/kg/day Q8H	Continue IV antibiotics at least 14-21d	≥42 IV to PO switch: after 14-21d & patient better	Local (deep neck space infection, jugular vein thrombosis) & distant (metastatic cerebral/ bone/ joint/ pulmonary abscess) complications not uncommon. Surgical drainage, anticoagulation may be crucial.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Para-/Retro-pharyngeal (or Deep Neck) abscess **- non-toxic**	Polymicrobial (aerobic & anaerobic Streptococci, other anaerobes, *S. aureus*, rarely Eikenella)	IV Amoxicillin/ Clav. 120mg/kg/day (Amox:100mg/kg/day) Q8H WITH/ WITHOUT IV Clindamycin 30mg/kg/day Q8H	IV Clindamycin 30mg/kg/day Q8H PLUS IV Ciprofloxacin 30mg/kg/day Q8H	Continue IV antibiotics at least 2-3d	14 IV to PO switch: after 5d & patient better	**Do not disturb child (as in epiglottitis)**. Urgent ENT, anaesthetist, intensivist consult to secure airway; surgical drainage required if airway compromised, ≥3 cm diameter, descending spread, or complicated.
- toxic (see Otolaryngol Clin N Am 2008;41:459)		(IV/ IM Ceftriaxone 50mg/kg/day Q12-24H PLUS IV Metronidazole 30mg/kg/day Q6H) WITH/ WITHOUT IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H	IV Meropenem 60mg/kg/day Q8H WITH/ WITHOUT IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H			
Paranasal Sinuses see Pediatr 2001;108:798, Am Fam Physician 2006;74:956						
Acute Sinusitis **- non-toxic**	Viruses, *S. pneumoniae*, *H. influenzae, M. catarrhalis,* Group A streptococcus	PO Amoxicillin 80-90mg/kg/day Q12H (preferred) OR PO Amoxicillin/ Clav. (Amox) 80-90mg/kg/day Q12H (if not better after 72h prior Rx) OR IV/ IM Ceftriaxone 100mg/kg/day Q12-24H (if unable to tolerate PO)	PO Bactrim (TMP) 8mg/kg/day Q12H (NB: worsening resistance rates limits usefulness) OR PO Levofloxacin[ID] 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo)	NA	7-10 (or ≥7d after patient better)	Persistent (>10-14d) or severe (fever ≥39°C, prolonged (>3-4d) purulent nasal discharge, toxic appearance) symptoms, & complications, suggest need for antibiotic Rx. Facial pain/ tenderness & nasal congestion useful but not specific. If dose volume of PO Amox suspension for Q12H dosing is large and intolerable, consider Q8H.
- toxic	As Above & *S. aureus*	(IV Amoxicillin/ Clav. 120mg/kg/day (Amox:100mg/kg/day) Q8H PLUS IV Ampicillin 100mg/kg/day) Q6H OR IV/ IM Ceftriaxone 100mg/kg/day Q12-24H	IV Levofloxacin[ID] 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo)	Continue IV antibiotics at least 2-3d	7-14 (or ≥7d after patient better)	Monitor for complications e.g. prespetal bital cellulitis, cavernous sinus thrombosis, meningitis & cerebral abscesses.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
EYE **see Red Book 2006, Pediatric Emergency Care 2003;19:48; CDC STI Guidelines 2021; Need to consider HSV skin, eye, mouth disease in any neonates presenting with conjunctivitis. Exclude keratitis/ corneal ulcer in children > 1mth. If keratitis/ corneal ulcer present, refer Eye STAT.**						
Conjunctivitis						
Ophthalmia Neonatorum (Age ≤5days) **see** British Journal of Ophthalmology, 1988, 72, 518-520	*Neisseria gonorrhoeae, Chlamydia trachomatis,* Streptococci*, H. influenzae, S aureus,* other GNB (enteric)	IV/IM Cefotaxime 100mg/kg/dose (neonates) x1 OR IV/IM Ceftriaxone* 50mg/kg/dose x1 (max. 250mg) Lavage eyes with NS 0.9% eyedrop 2 drops Q10min x 1H, then 2 drops Q30min x2-4H, then 2 drops Q1H x3d	NA	Continue with PO Cefuroxime (if non-gonococcal, non-chlamydial conjunctivitis)	*Neisseria gonorrhoeae:* 1 Non-gonococcal, non-chlamydial: 1-5	Send eye swab for gram stain and culture, gonoccoccal culture and Chlamydial IF. All patients with Opthalmia Neonatorum must be admitted until gonococcal conjunctivitis is ruled out. Eye referral mandated for all neonatal conjunctivitis. For Age>5-30days, TCU Eye next day. If very minimal mucopurulent discharge, diagnosis may be nasolacrimal duct obstruction which may not require admission, advise massage and discharge with early TCU with Eye. See "Specific organisms" for *N. gonorrhoeae/ C. trachomatis* / HSV/VZV Rx. *Use ceftriaxone if PMA ≥41 weeks, or if <28d & no hyperbilirubinemia
Ophthalmia Neonatorum (Age >5-30days)	*Chlamydia trachomatis,* Streptococci*, H. influenzae, S aureus,* other GNB (enteric), *Neisseria gonorrhoeae* (less common)	Tobramycin 0.3% eyedrop 1 drop Q4H	Levofloxacin 0.3% eyedrop 1 drop Q6H	NA	7	
Age 1mth-1yr	*S. pneumoniae*, *M. catarrhalis*, *H. influenzae, S. aureus*, Adenovirus	Tobramycin 0.3% eyedrop 1 drop Q4H	Levofloxacin 0.3% eyedrop 1 drop Q6H	NA	7	Regular irrigation with NS 0.9% eyedrop or Artificial tears helpful.
Age 1yr to 5yr	Adenovirus, uncommonly HSV, VZV, *S. pneumoniae*, *M. catarrhalis*, *H. influenzae, S. aureus*	(See Remarks) No empiric antibiotics; NS 0.9% eyedrop OR Artificial tears OR Tobramycin 0.3% eyedrop 1 drop Q4H	Levofloxacin 0.3% eyedrop 1 drop Q6H	NA	7	If purulent discharge with injection, consider bacterial conjunctivitis & Rx appropriately. If there is concomitant otitis media, Rx as per guidelines. See "Specific organisms" for HSV/VZV Rx.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Conjunctivitis (cont'd)						
Age >5yr	Viruses, allergic, uncommonly bacterial, HSV, VZV	No empiric antibiotics; NS 0.9% eyedrop OR Artificial tears; PO antihistamines useful; Sodium cromoglycate 2% eyedrop 1 drop Q6H	NA	NA	3	If bacterial conjunctivitis strongly suspected, see above. If HSV/VZV conjunctivitis strongly suspected, see below.
(Specific organisms)	*Neisseria gonorrhoeae*	IV/IM Cefotaxime 100mg/kg/dose (neonates) x1 OR IV/IM Ceftriaxone* 50mg/kg/dose x1 (max. 250mg) Lavage eyes with NS 0.9% eyedrop 2 drops Q10min x 1H, then 2 drops Q30min x2-4H, then 2 drops Q1H x3d	NA	NA	One dose (see remarks)	Usual onset 2 to 5d of life. Profuse creamy discharge, may be bloodstained. Eyelids swollen, periorbital edema usually present. Assess for complications eg. meningitis, Rx as per guidelines. KIV Rx Chlamydia simultaneously. *****Use ceftriaxone if PMA **≥**41 weeks, or if <28d & no hyperbilirubinemia
	Chlamydia trachomatis	PO Erythromycin 50mg/kg/day Q6H PLUS Chlortetracycline 1% eye ointment 1 application Q8H	NA	NA	14	Usual onset 5 to 14d of life, up to 6 weeks. Watery eye discharge, progresses to become purulent. 2nd course of erythromycin may be required (Alternative: Azithromycin 20mg/kg/day OD x 3 days)
	HSV	IV Acyclovir 60mg/kg/day Q8H (neonates) OR (PO Acyclovir 80mg/kg/day Q6H (max: 800mg/dose) PLUS Topical Ganciclovir 0.15% eye gel 1 application 5x/day	NA	NA	14-21 (21d if there is meningitis/ disseminated disease) IV to PO switch not encouraged	Usual onset 6 to 14d of life. Can be associated with eyelid edema, serous discharge. Look for typical vesicles elsewhere.
	VZV	As Above	NA	NA	7	NA

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Keratitis						
Acute keratitis	*S. pneumoniae*, *H. influenzae,* *S. aureus*, (*P. aeruginosa* in contact lens users) HSV, VZV	Tobramycin 0.3% eyedrop 1 drop Q15-60min d1-3, then Q4H Dendritic ulcer: Topical Ganciclovir 0.15% eye gel 1 application 5x/day	Levofloxacin 0.3% eyedrop 1 drop Q15-60min d1-3, then Q4H	NA	7	Refer Eye stat.
Hordeolum see TGA Antibiotics Guidelines 2014; UK College of Optometrists Guidelines 2015; FNIHB Ped Clin Pract Guidelines for Nurses in Pri Care 2010; Cochrane Database Syst Rev 2010; 9: CD007742						
External hordeolum (Stye)	*Staphylococcus aureus*	No empiric antibiotics; Warm compress, eyelid hygiene	No empiric antibiotics; Warm compress, eyelid hygiene	NA	NA	Most resolve spontaneously; removal of eyelash often aids resolution. Topical and oral antibiotics not required; consider antibiotic eyedrops only in presence of mucopurulent eye discharge.
Internal hordeolum (Meibomian abscess)				NA	NA	I&D may be necessary if persistent or recurrent. Consider oral antibiotics if accompanying cellulitis (see Skin & Soft Tissue Infections: Cellulitis).
Dacryocystitis see Opthal Plast Reconst Surg 2015;31:341-7; College of Optometrists Guidelines 2018; TGA Antibiotics Guidelines 2014						
-	*S. aureus, S. pyogenes, S. pneumoniae* (rarely *H. influenzae)*	Warm compress, eye massage (lacrimal duct/sac) WITH/ WITHOUT (Chlortetracycline 1% eye ointment 1 app Q12H OR Chloramphenicol 1% eye ointment 1 app Q12H) (if conjunctival inflammation) If severe: WITH/ WITHOUT* PO Cloxacillin 50mg/kg/day Q6H	Warm compress, eye massage (lacrimal duct/sac) WITH/ WITHOUT Chlortetracycline 1% eye ointment 1 app Q12H (if conjunctival inflammation) If severe: WITH/ WITHOUT* PO Clindamycin 30mg/kg/day Q8H	NA	5-7	Consider topical antibiotic only if conjunctival inflammation present. May present with concurrent conjunctivitis and preseptal cellulitis. *Refer to EYE if severe, I&D may be required.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Blepharitis see Am Acad Ophthalm PPP 2013; TGA Antibiotic Guidelines 2014. Arch Ophthalmol. 2005;123(12):1667–1670. British Journal of Ophthalmology 2005;89:400-403						
Anterior Blepharitis	*S. aureus* (both MSSA & MRSA), CoNS	(Warm compress, eyelid hygiene/massage PLUS Artificial tears) WITH/ WITHOUT (Chlortetracycline 1% eye ointment 1 app Q12H OR Chloramphenicol 1% eye ointment 1 app Q12H)	(Warm compress, eyelid hygiene/massage PLUS Artificial tears) WITH/ WITHOUT *****(Chlortetracycline 1% eye ointment 1 app Q12H OR Chloramphenicol 1% eye ointment 1 app Q12H)	NA	7	Eyelid hygiene, warm compress, and elimination of trigger(s) are mainstay of therapy. *Efficacy of topical antibiotic uncertain and not routinely recommended unless no/poor response to adequate eyelid hygiene; primarily to reduce bacterial load of lashes and conjunctivae.
Posterior Blepharitis	NA	Topical corticosteroid eye drops WITH/WITHOUT ^(Chlortetracycline 1% eye ointment 1 app Q12H OR Chloramphenicol 1% eye ointment 1 app Q12H) WITH/ WITHOUT PO Erythromycin 10mg/kg/dose Q24H (for anti-inflammatory effect, up to Q6H for therapeutic dose)*	Topical corticosteroid eye drops WITH/ WITHOUT ^(Chlortetracycline 1% eye ointment 1 app Q12H OR Chloramphenicol 1% eye ointment 1 app Q12H) WITH/WITHOUT PO Doxycycline 1mg/kg/dose Q24H (for anti-inflammatory effect, up to Q12H for therapeutic effect)*	NA	At least 4 weeks, duration depends on clinical response/ severity, refer Eye	Caused by abnormalities of meibomian glands, commonly associated with rosacea or seborrhoeic dermatitis. Daily eyelid hygiene and warm compress are mainstay of therapy. A short course of topical corticosteroid eye drops may reduce eyelid or ocular surface inflammation. ^Oral/topical antibiotics may be used only if symptoms not controlled by eyelid hygiene and warm compress; *used mainly for anti-inflammatory effect. If no improvement in symptoms after 4-6 weeks, doses can be increased up to therapeutic doses

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
GASTROINTESTINAL SYSTEM **see Surg Clin N Am 2009;89:421 & Clin Infect Dis 2010;50:133 for reviews on intra-abdominal infection. "Complicated" refers to infection in a hollow viscus extending into peritoneal space**						
Appendicitis/ Enterocolitis see Lancet 2011;377:1573 & Pediatrics 2007;119:905 for appendicitis; use in conjunction with "KKH Appendicitis Pathway". See above for other infections						
Immune Competent	Polymicrobial (GNB (enteric), enterococci, Bacteroides) (last 2 important in peritonitis due to perforated viscus)	(IV/ IM Ceftriaxone 50mg/kg/day Q12-24H (perforated) OR IV Gentamicin 7.5mg/kg/day Q8H (non-perforated)) PLUS IV Metronidazole 7.5mg/kg/dose Q8H	(IV Gentamicin 7.5mg/kg/day Q8H OR IV Ciprofloxacin 30mg/kg/day Q8H) PLUS IV Metronidazole 7.5mg/kg/dose Q8H	Continue IV antibiotics at least 1d, then PO Cephalexin & Metronidazole (or Ampi/ Sulbactam or Amox/ Clav) if complicated	1 (un-complicated) 7-14 (complicated) IV to PO switch: after 2d & patient better	Appendicectomy remains important & superior to antibiotics alone, although sequential IV-oral Amox-clav without surgery may be considered for very well, uncomplicated appendicitis. Addition of gentamicin for perforated appendicitis may be necessary.
Immune compromised (including Typhilitis)	As Above & Pseudomonas, drug resistant GNB, Candida etc.	IV Piperacillin/ Tazo. (Pip) 300mg/kg/day Q8H	IV Meropenem 60mg/kg/day Q8H	Continue IV antibiotics at least 7d, then PO Cipro & Metronidazole	7-14 IV to PO switch: after 7d & patient better	Gut is common source of continuous endogenous bacteraemia/ sepsis. Physiologic support & early source control critical. Consider addition of IV/PO Metronidazole if strong suspicion of *Clostridium difficile* (see "Specific organisms")
Neonate	Polymicrobial (GNB (enteric), enterococci, Bacteroides)	IV Ampicillin PLUS IV Gentamicin PLUS IV Metronidazole	IV Meropenem	Continue IV antibiotics at least 4d	≥4 IV to PO switch: not encouraged	See Appendix 7 for neonatal dosing. Requires high index of suspicion, usually in premature infants but can occur in term infants. May be fulminant. For neonates: may consider a Metronidazole loading dose of 15mg/kg/dose before maintenance doses.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Necrotizing Enterocolitis (in Neonatal ICU)	Polymicrobial (GNB (enteric), enterococci, Bacteroides)	**Stage 1 NEC :** IV Cloxacillin PLUS (IV Gentamicin OR Amikacin*) **Stage 2 NEC** : (IV Ampicillin OR Cefotaxime*/ ^Ceftriaxone 100mg/kg/day*) PLUS (IV Gentamicin OR Amikacin*) PLUS IV Metronidazole **Stage 3 NEC :** IV Cefotaxime/ ^Ceftriaxone 100mg/kg/day PLUS IV Amikacin PLUS IV Metronidazole	IV Meropenem	Continue IV antibiotics at least 2-7d	2-7 (Stage 1) 7-14 (Stage 2) ≥14 (Stage 3)	**Use in conjunction with KKH "Necrotizing Enterocolitis" Clinical Practice Guidelines Pathway" by Neonatology.** See Appendix for neonatal dosing. Consider Fluconazole prophylaxis in Stage IIA NEC and above. *if not better after 48-72H of prior Rx/ suspect resistant organisms. ^Use ceftriaxone if 1. PMA ≥41 weeks OR 2. term (37 weeks) and <28 days of life with no hyperbilirubinemia; do not use in neonates (< 28 days old) who are receiving Calcium-containing drips (including TPN).

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Ascending Cholangitis/ Cholecystitis/ Necrotizing Pancreatitis see J Hepatobiliary Pancreat Sci (2018) 25:3, Am J Gastroenterol 2013;108:1400,J Hepatobiliary Pancreat Surg 2007;14:98						
Acute Cholangitis/ Cholecystitis/ (usually post Kasai or patients with Haemo-globinopathy)	Polymicrobial (GNB (enteric), enterococci, Bacteroides, occ unusual drug resistant GNB)	IV Unasyn (Ampi) 200mg/kg/day Q6H* OR IV Piperacillin/ Tazo. (Pip) 300mg/kg/day Q8H	IV Ciprofloxacin 30mg/kg/day Q8H PLUS IV Metronidazole 7.5mg/kg/dose Q8H	Continue IV antibiotics at least 3-4d, then PO Unasyn or (Cipro & Metro. if prior colonization with Pseudomonas)	7-10 (≥21-28 if complicated*) IV to PO switch: after 3-4d & patient better	Ensure adequate hydration. Fasting may be required. *Complicated: positive sterile site cultures with bile lakes, cysts, dilatations, recurrent cholangitis, abscesses. *NB: Current cost ≥ 5 times that of Piptazo
Acute/ idiopathic pancreatitis (see J Surg 2009;146:72, Cochrane Database Syst Rev 2010;5:CD 002941)	Non-bacterial	No Antibiotics required	Routine prophylactic antibiotics in severe acute pancreatitis or sterile necrosis not recommended. Monitoring procalcitonin levels can help exclude bacterial infection and assess prognosis. Consider infected pancreatitis in patients with pancreatic/ extrapancreatic necrosis who do not improve after ≥7 days.			
Infected/ Severe necrotizing pancreatitis (see Gastroenterology 2007;132:2022)	Polymicrobial (GNB (enteric), Bacteroides, occ unusual drug resistant GNB)	IV Ceftriaxone 100mg/kg/day Q12H PLUS IV Metronidazole 7.5mg/kg/dose Q8H	IV Ciprofloxacin 30mg/kg/day Q8H PLUS IV Metronidazole 7.5mg/kg/dose Q8H	Continue IV antibiotics at least 7d	7-14	Criteria: (i) local complications (infected necrosis, hemorrhage, abscess) (ii) organ dysfunction present. Consider CT to identify necrotic areas. Gas within the pancreas is highly suggestive but not diagnostic of infected necrosis. Consider CT-guided fine needle aspiration for Gram stain and culture to guide antimicrobial therapy. Routine antifungals not recommended.
Post-Kasai prophylaxis (see Pediatr Gastroenterol Hepatol Nutr. 2021;24(4):366-376, J Pediatr Surg 2003;38:590)	Polymicrobial	PO Bactrim (TMP) 4mg/kg/day Q24H (max TMP 160mg/day) OR PO Cephalexin (if G6PD deficient) 15mg/kg/day Q24H (max 500mg)	PO Neomycin 25mg/kg/day Q6H 4x/week	NA	Up to 1 yr of age	Decreases risk of cholangitis.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Primary Spontaneous Bacterial Peritonitis						
Nephrotic syndrome see Am J Dis Child 1982; 136: 732- 6; Pediatrics 1988; 81(6): 849-56); Eur J Pediatr 2010; 169: 73-6; Am J Nephrol 1988; 8:147-65;	*S. pneumoniae*, occ. GNB (enteric)	IV/IM Ceftriaxone 50mg/kg/day* Q12-24H OR IV Ampicillin 200mg/kg/day Q6H	IV Levofloxacin[ID] 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo)	Continue IV antibiotics at least 2-3d, then PO Amox (80mg/kg/day)	5-7 (May require longer duration if response is delayed (persistently febrile, toxic with up-trending infective markers), complicated e.g. bacteremic, up to 10-14d)	At risk for infections (esp. encapsulated bacteria), partly due to properdin/ immunoglobulin deficiency. If hypoalbuminemia, consider dosing Ceftriaxone Q12H. *up to 100mg/kg/day if severe
Non-nephrotic see Hepatol 2021; 74(2): 1014-48; J Hepatol 2018; 69(2): 406-460; Gastroenterol 1991; 100:1737-42	Polymicrobial (enteric GNB such as *E. coli, K. pneumoniae*), enterococci	IV/ IM Ceftriaxone 50mg/kg/day* Q12-24H OR IV Cefotaxime 50mg/kg/dose Q8H OR IV Amoxicillin/ Clav. 120mg/kg/day (Amox: 100mg/kg/day) Q8H		Continue IV antibiotics at least 2-3d, then PO Cefuroxime 30mg/kg/day Q12H OR PO Ciprofloxacin 30mg/kg/day Q12H (in view of temporary stock disruption of Cefuroxime suspension)		Uncommon in children, usually cirrhotic with ascites. Send ascitic fluid for differential count. If hypoalbuminemia, consider dosing Ceftriaxone Q12H. Secondary prophylaxis may be considered in some patients, consult Gastro/ID. *up to 100mg/kg/day if severe
Perianal Abscess see Dis Colon Rectum 2011; 54(1465-74), CDC 2015; 64(RR3):1-137						
- non-toxic	Polymicrobial (mainly S. aureus. Streptococci, GNB (enteric), anaerobes etc)	PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H	PO Clindamycin 30mg/kg/day Q8H	NA	≥14	Surgical drainage remains the main stay of therapy. Abx therapy may be considered if extensive cellulitis, systemic symptoms, underlying immunosuppression or failure to respond to drainage alone. Syphilis (VDRL) and HSV testing (to rule out genital Herpes) should also be considered.
- toxic, immune competent		(IV Ampicillin 100mg/kg/day Q6H PLUS IV Cloxacillin 200mg/kg/day Q6H) OR IV Amoxicillin/ Clav. 120mg/kg/day (Amox: 100mg/kg/day) Q8H	IV Clindamycin 40mg/kg/day Q6H PLUS IV Ciprofloxacin 30mg/kg/day Q8H	Continue IV antibiotics at least 2-3d, then PO Amox/ Clav. (Amox) 50mg/kg/day.	≥14 IV to PO switch: after 2-3d & patient better	
- toxic, immune compromised		IV Piperacillin/ Tazo. (Pip) 300mg/kg/day Q8H				

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Acute Liver Failure see Hepatology 2012; 55(3):965-7; J Hepatol 2017; 66:1047-81; Hepatol Intl 2019;13:353-90; Crit Care Med 2007;35(11); Clin Gastroenterol Hepatol 2014:1942-9; Hepatology 1993;17:196-201; JPGN 2011;53: 320–325						
(Prophylaxis)	Polymicrobial (GNB (enteric), *S. aureus*, enterococci, Bacteroides, Candida etc)	IV Ampicillin/ Sulb. (Ampi) 200mg/kg/day Q6H WITH/ WITHOUT* IV Fluconazole 3-6mg/kg/day Q24H	IV Ciprofloxacin 30mg/kg/day Q8H PLUS IV Metronidazole 30mg/kg/day Q6H (if anaerobic cover needed) WITH/ WITHOUT* IV Fluconazole 3-6mg/kg/day Q24H	Continue IV antibiotics at least 7d (if used), then PO Ampi/ Sulbactam	7-14 IV to PO switch: after 7d & patient better	Prophylactic antibiotics and anti-fungals may be considered but have not been shown to improve overall outcomes. Shown to reduce infection in certain groups but survival benefit not shown. Consider periodic antimicrobial surveillance, initiate empiric antimicrobials at earliest sign of infection i.e. progression to high-grade hepatic encephalopathy, or clinical signs of infection. If Herpes Simplex virus (HSV) infection is suspected, start IV Acyclovir. *May consider if risk factors for invasive candidiasis exists, e.g.: prolonged broad-spectrum antimicrobials use, presence of CVC, TPN, corticosteroids use, mechanical ventilation, H2RA use, GI surgery, hyperglycemia

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Helicobacter pylori (*H. pylori*) infection see SMJ 2017; 58(5): 234-40; Am J Gastroenterol 2017; 11:212-38; JPGN 2011; 53: 230-243; Gastroenterol 2016; 151: 51-69; Gastroenterol 2021;161(2):495-507; Digestion 2016;93:167–173, Gut Liver 2021;15:13-18),						
-	*Helicobacter pylori*	PO Amoxicillin 50mg/kg/day Q12H (max 1g Q12H) PLUS PO Clarithromycin 20mg/kg/day Q12H: (max 500mg Q12H) PLUS PO Omeprazole 1-2mg/kg/day Q12H	(PO Metronidazole 40mg/kg/day Q6H: max 400mg Q6H* OR PO Tetracycline 25-50mg/kg/day Q6H) (non-formulary)**) PLUS PO Clarithromycin 20mg/kg/day Q12H: (max 500mg Q12H) PLUS PO Omeprazole 1-2mg/kg/day Q12H WITH/ WITHOUT PO Bismuth subcitrate 8mg/kg/day Q6H (max 120mg/dose)* (if metronidazole used or as rescue therapy)	NA	14	In Singapore: ↑ resistance for Clarithromycin from 7.9% (2000-2002) to 17.1% (2012-2014) and Metronidazole from 24.8% (2000-2002) to 48.2% (2012-2014) but a recent RCT still showed high eradication rates (>90%) in clarithromycin-containing triple therapy. *Bismuth-based quadruple therapy is preferred if 1. metronidazole is used to replace amoxicillin (efficacy only 69.6% in triple therapy), or 2. part of rescue therapy/ fail first-line. **May consider substituting with PO Doxycycline 4mg/kg/day Q12H (max 100mg Q12H) but less studied Refer to Gastro if presence of alarm features (anaemia, LOW, malaena or haematemesis, dysphagia). Test for eradication at least 4 wks after completion and after PPI withheld for 1-2 wks.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Intestinal helminthic infections see Pediatr Rev 2015; 35:341; Red Book 2015						
-	Pinworm (*Enterobius vermicularis*), Threadworm (*Strongyloides stercoralis*), Hookworm (*Ancylostoma duodenale* and *Necator americanus*), Roundworm (*Ascaris lumbricoides),* Whipworm (*Trichuris trichiura)*	PO Albendazole x1 & 2-3wk later: ≤2yo: 200mg/dose >2yo: 400mg/dose OR PO Mebendazole **(Pin-worm, thread-worm:** x1 & 2wk later: ≥6 months AND ≤10kg: 50mg/dose ONCE ≥6 months AND >10kg:100mg/ dose ONCE **Round-worm, hook-worm and whip-worm*** ≥1 yr:100mg BD x 3 days) (non-formulary)	PO Ivermectin 150-200 mcg/kg/day Q24H (non-formulary)	NA	1 dose (alben; meben; unless specified) 2 (ivermec)	Ivermectin may not be effective against pinworm, hookworm, and tapeworm infections. Limited data for use of Albendazole in <6mo (PIDJ 1990; 9(5): 373; ActaTrop 2003; 86(2-3): 223–232; Pediatr 2001; 68(9):823–827) Limited data for use of Ivermectin in child <15kg. Re-examine stool 2 weeks after, repeat treatment if necessary.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Gastroenteritis see MMWR 2003;52:RR-16, WGO Practice guidelines (http://www.worldgastroenterology.org/assets/downloads/en/pdf/guidelines/01_acute_diarrhea.pdf)						
Non-toxic, watery, no risk factors* for invasive disease, transiently bloody (e.g. due to anal tears) (see J Clin Gastroenterol 2011;45:S149)	Viruses (esp Rota, Noro, Astro, Adeno etc.), Bacteria & toxins (Salmonella, Campylobacter, *E. Coli*, Shigella, Vibrio, Clostridia etc.), Parasitic (Giardia, Cryptosporidium, Entamoeba etc.)	No Empiric Antibiotics; No Anti-motility agents; Adequate Rehydration & Replacement of electrolyte losses PLUS PO Probiotics (Lactobacillus GG or S. boulardii) WITH/ WITHOUT PO Zinc 10-20mg/day (in developing countries)	NA	NA	14 (Zinc)	Consider risks of antibiotics Rx: adverse drug reactions (esp. skin, GI, haematologic), prolonged diarrhoea due to alteration of flora, ↑ risk of *C. difficile* disease, possible ↑ risk of hemolytic uremic syndrome. Probiotics have modest but significant effect.
Toxic, suspected bacterial infection with severe symptoms or risk factor(s)* for invasive disease	As Above, ↑ risk of bacterial (esp. Salmonella locally) & Entamoeba infections (travel)	**If severe/ high suspicion of invasive disease/ unable to tolerate PO:** IV/ IM Ceftriaxone 100mg/kg/day Q12-24H WITH/ WITHOUT PO/IV Metronidazole 30mg/kg/day Q8H (if suspect anaerobes/ entamoeba)	**If able to tolerate PO:** PO/IV Bactrim (TMP) 10mg/kg/day Q12H (preferred) OR PO Azithromycin 10mg/kg/day Q24H (if G6PD unknown/ deficient or <2 months old)	Consider stopping antibiotics if no bacterial organism; if still strongly suspect bacterial infection/ pathogen identified, refer to "Specific organisms" below for guidance on duration.		**See: GE algorithm (Appendix A)** Stool cultures +/- parasitic examination essential. ***Risk factors for invasive disease:** age <3mth, immune-compromised, major comorbidities (IBD, chronic GI conditions, malnutrition, failure to thrive).
Gastroenteritis (Specific organisms)						
Viruses	Adenovirus, Astrovirus, Norovirus GI/GII, Rotavirus, Sapovirus	**Self-limiting, treatment not required.** **Supportive care (adequate hydration) is key.** **Refer ID if concern re: prolonged diarrhoea in immunocompromised patients i.e. norovirus.**	NA	NA	NA	**Common presentation:** Vomiting, watery diarrhoea, abdo cramps, nausea **Incubation period:** <48h (prolonged shedding for mths in immunocompromised) **Implicated sources:** (norovirus/ sapovirus): ice, raw shellfish, ready-to-eat food; others: faecal-oral route

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Gastroenteritis (Specific organisms)						
Bacteria	***Campylobacter*** see CDC Yellow Book 2024; Red Book 2024-7; CID 2017;65(12): e45–e80; J Pediatr Gastroenterol Nutr 2014 Jul;59(1):132-52; J Pediatr 1986; 109(2): 355-60; CID 1005; 21(3): 536-41	**Self-limiting, resolve in ≤1wk.** Treat only if: <3mo, immune-compromised, or severe		NA	5d (Erythro); 3d (Azithro); 3-5d (Cipro)	**Common presentation:** Diarrhoea (often bloody), abdo pain, fever, nausea & vomiting. Can mimic appendicitis or intussusception. **Incubation period**: 1-10d **Implicated sources:** Undercooked food (poultry), contaminated water, unpasteurized dairy
		PO Erythromycin 50mg/kg/day Q6H (preferred) OR PO Azithromycin 10mg/kg/day Q24H	PO Ciprofloxacin 30mg/kg/day Q12H			
	Clostridioides difficile see CID 2018; 66(7); e1-48; Am J Gastroenterol 2021; 116(6): 1124-47; Red Book 2024-7; ICHE 2010; 31(5):431-55, JAMA Pediatr 2013; 167(6):567-573	**Stool GI PCR is non-confirmatory**. Asymptomatic intestinal colonization is common in young children esp. <2yo which does not require treatment. **If *C. difficile* is suspected, send stool for *C. difficile* toxins/ GDH**. **Discontinue therapy with the inciting antimicrobial agent(s) ASAP.** Avoid use of anti-peristaltics.		NA	10-14d (Metro/Vanco)	**Common presentation:** Diarrhoea, fever, abdo pain. Severe-pseudo-membranous colitis, toxic megacolon **Incubation period:** 5d to 10wk **Implicated sources:** Recent antimicrobials, PPI use
		Mild-moderate PO Metronidazole 30mg/kg/day Q8H (max 400mg Q8H)	**Severe:** PO Vancomycin 40mg/kg/day Q6H (max 500mg Q6H)			
	Plesiomonas shigelloides see CID 2017;65(12): e45–e80; Clin Microb Rev 2016; 29: 349-74	**Self-limiting, resolve in 2-4d.** Treat only if: <3mo, immune-compromised, severe, extra-intestinal infection. Send stool c/s for susceptibilities if severe/ extraintestinal infection.		NA	3-5d (Cipro/ Cotrimox); 3d (Azithro) Longer duration if bacteraemia/ extraintestinal disease	**Common presentation:** Diarrhoea (may be bloody or with mucus), abdo pain, fever, vomiting. Chronic diarrhoea up to >14d-2mth possible. **Incubation period**: <48H **Implicated sources:** Raw shellfish, swimming/ drinking untreated water, travel
		PO Ciprofloxacin 30mg/kg/day Q12H	PO Bactrim (TMP) 8 – 10mg/kg/day Q12H OR PO Azithromycin 10mg/kg/day Q24H (if G6PD deficient)			

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Gastroenteritis (Specific organisms)						
Bacteria	***Salmonella spp.*** see CDC Yellow Book 2024; Red Book 2024-7	**GI PCR does not distinguish between typhoid & non-typhoid (NTS) strains. No treatment if mild/ immunocompetent, abx does not ↓duration, may ↑stool carriage**. Treat only if: <3mo, immune-compromised, severe, chronic GI disease. Treat all typhoid/ paratyphoid fevers (enteric fevers) & *S. typhi/ paratyphi* carriage to prevent community transmission. Send blood and stool c/s if severe. Consult ID if extra-intestinal manifestations.		NA	5-14d	**Common presentation:** Diarrhoea (may be bloody with mucus), abdo cramps, fever **Incubation period:** 12H to ≥7d **Implicated sources:** Dairy, eggs, meat, water; travel (India, Pakistan) **duration includes IV ceftriaxone if used*
	Nontyphoidal Salmonella (NTS) Child Health 1999; 35, 372–374; CID 2004; 38: 951-7 J Infect Dis.1993; 168(5): 1304-7; Arch Intern Med 1990; 150(3):541-6; Pediatrics 1973; 83(4): 646	PO Bactrim (TMP) 8 – 10mg/kg/day Q12H OR IV/ IM Ceftriaxone 100mg/kg/day Q12-24H (if severe/ bacteremia)	PO Azithromycin 10mg/kg/day Q24H (max 500mg) (if G6PD deficient or <2mo)	NA	No bacteremia: 5-7d* Severe/ bacteremia: 7-10d*, consult ID	
	Salmonella enterica, typhi or paratyphi	As above	As above		7-14d*, consult ID 14d* (Co-trimox) 7d (Azithro*/ Ceftriax)	
	Yersinia enterocolitica see CDC Yellow Book 2024; Red Book 2024-7; CID 2017;65(12): e45–e80; J Pediatrics 1984; 104 (2): 308-311; JAC 1987; 20: 123-31; PIDJ 1993; 12: 386-9; PIDJ 2000;19: 954-8	**Self-limiting, tx does not ↓duration.** Treat only if: <3mo, immunocompromised, severe, extra-intestinal, bacteremia.		NA	5d Longer duration if bacteremia/ extraintestinal disease	**Common presentation:** Diarrhoea (may be bloody or with mucus), abdo pain, fever. **Incubation period**: 1-14d, up to 2-3mth (asymptomatic carriage) **Implicated sources:** Under-cooked food (pork), untreated water, unpasteurized milk
		PO Bactrim (TMP) 8 – 10mg/kg/day Q12H	PO Ciprofloxacin 30mg/kg/day Q12H OR PO Doxycycline 2mg/kg/dose Q12H (if intolerant to 1st line/ G6PD deficient/ age <2mo)			

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Gastroenteritis (Specific organisms)						
Bacteria	***Vibrio* spp.** (others e.g. *V. para-haemolyticus, V. vulnificus, etc)* see Red Book 2024-7; Int J Infect Dis. 2024; 141: 106955; Microbes Infect 2000;2(2):177-88; Am Fam Physician. 2007;76(4):539-544; CID 2003; 37(2): 272-80; CID 2017;65(12): e45–e80; CID 1996; 22: 1019-25; Med Mal infect 2007; 37(10): 673-7; Rev Chil Infect 2005; 22(2): 131-140	**Self-limiting, resolve in 2-5d.** Treat only if: severe diarrhoea, septicemia or wound infection. Refer ID if severe- may require IV 3rd generation cephalosporin (ceftriaxone/ ceftazidime) + doxycycline/ ciprofloxacin		NA	1 dose (Doxy); 3-5d (Cipro) Longer duration up to 7-14d if septicemia/ wound infection	**Common presentation:** Non-bloody diarrhoea, sudden fever, chills, abdo cramps, nausea/vomiting. If severe; septicemia or wound infection **Incubation period:** 24H to 7d **Implicated sources:** Under-cooked seafood, contaminated water, seawater contact
		PO Doxycycline 4-6mg/kg/dose x1 dose (max 300mg/dose)	PO Ciprofloxacin 30mg/kg/day Q12H			
	Vibrio cholerae see: CDC Yellow Book 2024; Red Book 2024-7; Paediatr Int Child Health. 2018 Nov;38(sup1): S16-S31; Journal of Clinical and Diagnostic Research. 2020 Apr, Vol-14(4): SC01-SC06; CID 2017;65(12): e45–e80; Cochrane Database Sys Rev 2014(6): CD008625' WHO Managing Epidemics (2023)	**Rehydration is key.** Note: GI PCR does not distinguish between *Vibrio cholerae* O1, O139, and non-O1, non-O139 (classical epidemic cholera is only caused on O1 and O139); pls send stool culture. Treat only if: confirmed *V. cholerae* O1/ O139 on stool culture, severe (dehydration, ongoing fluid losses). Abx ↓duration/ diarrhoea vol/ stool carriage. If non-O1/O139, see above recommendations for Vibrio spp.		NA	Single dose (Azithro/ Doxy/ Ciprofloxacin);	**Common presentation:** Acute, profuse diarrhoea (rice-water: white, foul-smelling with mucus), vomiting with severe dehydration **Incubation period**: 1-5d **Implicated sources:** Under-cooked seafood, untreated water, swimming in recreational water (fresh and brackish water)
		PO Doxycycline 4–6 mg/kg/dose x1 dose (max 300mg/dose)	PO Ciprofloxacin 20mg/kg/dose x1 (max 1g/dose) OR PO Azithromycin 20mg/kg/dose x1 dose (max 1g/dose)			

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Gastroenteritis (Specific organisms) see: CDC Yellow Book 2024; Red Book 2024; Clin Infect Dis. 2017 29;65:e45-e80; J Pediatr Gastroenterol Nutr 2014;59(1):132-52						
Bacteria	**Enterotoxigenic *E. coli* (ETEC)/ Enteropathogenic *E. coli* (EPEC)** see: ETEC: Clin Infect Dis. 1993;17:779-82; Ann Intern Med. 1991;114:731-4; Clin Infect Dis. 2001:1;33:1807-15; Ann Intern Med. 1987;106:216-20; N Engl J Med. 1982: 30;307:841-4; Clin Infect Dis 2007;45:294–301 EPEC: J Infect Dis. 1980; 141:27-31; Rev Infect Dis. 1982:4:540-5	**No antibiotics recommended unless severe, immune-compromised, with relevant symptoms and history of travel to developing countries.** **Limited evidence for antibiotic use in EPEC and azithromycin as a treatment option.**		NA	3d (Azithro, Cipro); 5d (Bactrim)	**Common presentation:** Diarrhoea (watery, non-bloody), occ. cramps, vomiting, mild fever (EPEC) **Incubation period:** 0.5-3d **Implicated sources:** Travel (developing countries), infantile diarrhea (EPEC in developing countries)
		PO Bactrim (TMP) 8mg/kg/day Q12H	PO Azithromycin 10mg/kg/dose Q24H (if G6PD-deficient) OR PO Ciprofloxacin 30mg/kg/day Q12H			
	Enteroaggregative *E. coli* (EAEC) see: Front Cell Infect Microbiol. 2018: 27:8:306; Clin Infect Dis. 1999;29:335-8	**Limited evidence for antibiotic use in EAEC.** **No antibiotics recommended unless severe/ prolonged diarrhea in the immune-compromised**. Usually self-limiting (3-14d). Treatment may not ↓ duration unless severe/prolonged infection in the immune-compromised.		NA	3d (Azithro, Cipro)	**Common presentation:** Diarrhea (watery with mucus, occ. bloody), may be prolonged ≥14d esp. immunocompromised **Incubation period:** 0.5-2d **Implicated sources:** Travel, infantile diarrhoea (in developing countries)
		PO Azithromycin 10mg/kg/dose Q24H	PO Ciprofloxacin 30mg/kg/day Q12H			

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Gastroenteritis (Specific organisms) see: CDC Yellow Book 2024; Red Book 2024; Clin Infect Dis. 2017 29;65:e45-e80; J Pediatr Gastroenterol Nutr 2014;59(1):132-52						
Bacteria	***Shigella*l Enteroinvasive *E. coli* (EIEC)** see: WHO Guidelines 2005; Paediatr Int Child Health. 2018; 38(sup1):S50-S65.; Cochrane Database Syst Rev 2010(8): CD006784; Pediatrics in Review, 2014: 35(6), 261–262; CID 2007; 44(3): 338-46; J Pediatr Pharmacol Ther 2008; 13(1): 29-43 Pediatr Infect Dis J. 2000;19(11):1060-7, J Pediatr. 1991;118:627–632 CID 1999;29(4):942-3 Ann Intern Med. 1997;126:697-703 J Infect Dis 1990 Sep; 162 (3):711-6; J Pediatr. 1993;123(5):817-21, AAC 1989;33(7):1101-4	EIEC genetically similar to Shigella but causes less severe disease. **Send stool cultures for susceptibility testing. Treat only if relevant symptoms, severe/ dysentery esp. if fever, bloody stools or immunocompromised. Mild self-limiting within 5-7d**. May consider tx if symptomatic culture-proven if: attending childcare or food handlers (to limit transmission). Hygiene precautions. **Non-severe:** PO Bactrim (TMP) 8mg/kg/day Q12H (unless resistant) OR PO Azithromycin 10mg/kg/day Q24H (max 500mg/dose, if G6PD deficient)	Severe/ unable to tolerate PO: IV/IM Ceftriaxone 50mg/kg/day Q12-24H OR IV/PO Ciprofloxacin 30mg/kg/day Q12H (if resistant to other options)	NA .	3d (Azithro, Ceftriax, Cipro); 5d (Bactrim) Up to 5-7d (esp. if immuno-compromised)	**Common presentation:** Diarrhea (watery, may progress to dysentery with blood and/or mucus), fever, abdo pain/ cramps, tenesmus **Incubation period:** 0.5-2d **Implicated sources:** Travel, contaminated food, water; transmission: fecal-oral, uncommonly person-person, can cause outbreaks (e.g. food-borne, childcare, institutions)
	Shiga-like toxin producing *E. coli* (STEC)/ E. coli O157	**Treatment is NOT recommended. Use of antibiotics ↑ risk of hemolytic uremic syndrome** Stop antibiotics and anti-motility meds if possible. HUS – monitor Hb/platelets, UECr, avoid nephrotoxins Self-limiting (5-7d), persistent >14d reported.		NA	NA	**Common presentation:** Diarrhoea (watery, often progresses to bloody if O157), severe, abdo pain, cramps, occ. low grade fever **Incubation period:** 3-4d **Implicated sources:** Contaminated food (unpasteurized dairy, uncooked meat, fresh produce), exposure to untreated water, zoo

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Gastroenteritis (Specific organisms)						
Parasites	***Cryptosporidium*** see CDC Yellow Book 2024; Red Book 2024-7; CID 2017;65(12): e45–e80; Ped Clin North Am 2017; 64(4): 837-50; DHHS Guidelines for Prevention and Treatment of OI in Children with and Exposed to HIV (2023); Medicine (Baltimore) 1997; 76(2): 118-39 Cureus 2021; 13(9): e18340; Pediatr Blood Cancer 2020; 67(11):e28470. Clin Transp 2019; 33(9): e13618	**Self-limiting ≤2wk, may be prolonged course. Refer ID.** Send stool for Cryptosporidium/ Isospora/ Cyclospora microscopy (≥3 stools samples on separate days as oocysts shedding intermittent). Treat only if: immune-compromised, extraintestinal (biliary, lungs, pancreas). Optimal treatment in immunocompromised patients remains unclear; immune reconstitution may lead to parasitologic/ clinical response.		NA	14 – 21d (Paromo); 3 – 14d (Nitazox/ Azithro); longer duration up to 14d recommended for immuno-compromised	**Common presentation:** Diarrhoea (non-bloody), abdo pain, fever, nausea/vomiting **Incubation period:** 5d-≤2wk **Implicated sources:** Contaminated drinking or recreational water, un-pasteurized dairy, petting zoo/ farm
		PO Paromomycin 25 – 35mg/kg/day Q6-12H (max 500mg QDS) (non-formulary, exemption)	PO Nitazoxanide 1-<4yo: 100mg Q12H 4-<12yo: 200mg Q12H ≥12yo: 500mg Q12H (non-formulary, exemption) WITH/WITHOUT PO Azithromycin 10mg/kg/day Q24H			
	Cyclospora cayetanensis See CDC Cyclosporiasis (updated 2019); Red Book 2024-7; Microorg 2021; 9(9); 1863; Ann Intern Med 2000; 132(11): 885-8	**Self-limiting, may last for mths.** Treat only if: severe, immunocompromised, extra-intestinal (rare-biliary, lung, pancreas). Refer ID if G6PD deficient – KIV PO nitazoxanide (non-formulary, exemption).		NA	7 – 10d (Co-trimox); 7d (Cipro)	**Common presentation:** Diarrhoea (non-bloody), abdo pain, fever, nausea/vomiting. May have relapsing symptoms for wks to mths **Incubation period:** 2d-2wk **Implicated sources:** fruits/ vegetables
		PO Bactrim (TMP) 8 – 10mg/kg/day Q12H	PO Ciprofloxacin 30mg/kg/day Q12H			

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Gastroenteritis (Specific organisms)						
Parasites	***Entamoeba histolytica*** see CDC Yellow Book 2024; Red Book 2024-7; CID 2017;65(12): e45–e80	**Refer ID.** Treatment is recommended for all patients (including asymptomatic). Send amoebic Ab. Imaging may be required to identify other extraintestinal sites e.g. liver.		NA	7 – 10d (Metro); 7d (Paromo)	**Common presentation:** Cramps, bloody diarrhoea, weight loss, may last wks. Extraintestinal possible-usually liver (RUQ pain, fever) **Incubation period:** variable (2-4wks, up to mths to years) **Implicated sources:** Faeces-contaminated food, travel to resource-limited countries
		If asymptomatic (intraluminal disease): PO Paromomycin 25 – 35mg/kg/day Q8H (non-formulary, exemption)	**If symptomatic/ extraintestinal:** IV/PO Metronidazole 35 – 50mg/kg/day Q8H (max 750mg/dose) FOLLOWED BY PO Paromomycin 25 – 35mg/kg/day Q8H (non-formulary, exemption)			
	Giardia lamblia see CDC Yellow Book 2024; Red Book 2024-7; CID 2017;65(12): e45–e80; Clin Microb Rev 2001; 14(1): 114-28; Cochrane Database Syst Rev 2012; 12: CD00787; Clin Transpl 2019; e13618; Clin Microb Infect 2004; 10(6); 527-9	**Self-limiting, treatment not required.** Treat only if: severe, immuno-compromised. Symptoms recurrence is possible even after treatment completion, due to post-Giardia irritable bowel, residual lactose intolerance (20-40%), or reinfection (usually in immunocompromised). May consider Rx in group settings that pose a risk of transmission (e.g. childcare, institutionalized etc.).		NA	5 – 7d (Metro); 5d (Albendaz)	**Common presentation:** Diarrhoea (foul-smelling, greasy), abdo cramp, bloating, If chronic: recurrent sx, malabsorption with weight loss **Incubation period:** 1-4wks **Implicated sources:** contaminated drinking/ recreational water, exposure to infected faeces (e.g. childcare)
		PO Metronidazole 15 – 25mg/kg/day Q8H (max 400mg Q8H)	PO Albendazole 10-15mg/kg/day Q24H (max 400mg/day)			

APPENDIX A

MAJORITY OF PATIENTS WITH GASTROENTERITIS DO NOT REQUIRE ANTIBIOTICS

Acute Community-Acquired Gastroenteritis

(≥3 loose/watery stools in 24 hours, no stool softener/laxatives in past 36 hours, admitted for <=72 hours, *C. difficile* not leading suspected cause of diarrhoea)

Please refer to the appropriate department guidelines for investigations and treatment if patient also meets criteria for other pathways such as infantile pyrexia pathway, febrile neutropenia , *etc*

Severity of diarrhea based on **hydration status** (KKH Gastroenteritis Guidelines pg 362)

Mild to moderate dehydration

Oral or IV hydration as per KKH Gastroenteritis Guidelines pg 364

Evaluate risk factors for sending investigations

If (any of the following):
1. Toxic/septic looking
2. Immunocompromised
3. Presence of major comorbidities (IBD, chronic GI conditions, malnutrition, failure to thrive)

- Send stool culture AND stool GI PCR panel.
- Other laboratory investigations, FBC & CRP as clinically indicated.

NO

If (any of the following):
1. Diarrhea > 7 days
2. Presence of bloody stools

YES

- Send stool culture AND stool rotavirus antigen as 1st line
- **Only send stool GI PCR if: stool culture negative, not improving AND > 14 days since the last stool GI PCR order**
- Other laboratory investigations as clinically indicated.
- FBC & CRP not routinely recommended.

NO

No need for stool testing

No antibiotics required

SEVERE dehydration

To treat as emergency and give fluid bolus and intravenous hydration as per KKH Gastroenteritis Guidelines pg 364

Evaluate if meets criteria for empiric antibiotics

If (any of the following):
1. Severe dehydration
2. Toxic/ septic
3. Immunocompromised
4. Major comorbidities: IBD, chronic GI conditions, malnutrition, failure to thrive
5. <3 months with suspected bacterial GE

YES

Trace stool studies.
Empiric antibiotics according to KKH Antimicrobial Guidelines: Gastroenteritis (specific pathogens)

NO

WATCH & WAIT FOR RESULTS
Refer to **KKH Antimicrobial Guidelines: Gastroenteritis (specific pathogens)** if specific treatment required according to pathogen identified

Pathogen

YES

Rationalize antibiotics based on KKH Antimicrobial Guidelines: Gastroenteritis (specific pathogens)

NO

Consider **STOPPING antibiotics.**
If bacterial infection is still strongly suspected, treat based on **KKH Antimicrobial Guidelines: Gastroenteritis (specific pathogens) according to clinical syndrome or suspected pathogen.**

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
GENITO-URINARY SYSTEM						
URINARY TRACT see Pediatr 2011;128:595–610, NEJM 2011;365:239-50, Cochrane Database Syst Rev 2014: CD003772; use in conjunction with "KKH Clinical Guideline for Newly Diagnosed Uncomplicated Febrile UTI". **Must check renal panel/ do aminoglycoside therapeutic drug monitoring (TDM) if used >3d** (esp. high risk pts e.g. neonates).						
Presumptive Upper Tract (Pyelonephritis) UTI is presumed if there is unexplained fever + pyuria without obvious source/ contact history, confirmed if significant bacteriuria present (refer to UTI guidelines for number of CFU/ml required for significance); acute DMSA helpful if cultures equivocal/ negative but strong clinical suspicion of acute pyelonephritis. Collect urine cultures b4 Rx.						
Age <1mth see Pediatrics 2017;140(6): e20171021; Pediatrics. 2019; 144(3): e20183844; Pediatrics 2012;129:e269–e275; Pediatrics 2010; 126(2): 196–203; Arch Dis Child 2016;101(2): 125–130	GNB (enteric) (commonly *E. Coli*, Proteus), enterococci	IV Ampicillin PLUS IV Gentamicin	(IV Cefotaxime OR IV/ IM Ceftriaxone 50mg/kg/day Q12-24H)* WITH/ WITHOUT IV Vancomycin)	Continue IV antibiotics at least 3d (or 24H afebrile) if non-bacteremic; min 7d if bacteremic. Review dx (Procalcitonin/ acute DMSA may help)	10--14 *Min. 7d IV total if no PO option & non-bacteremic	**See Appendix 7 for neonatal dosing.** *Consult ID/Allergy if penicillin allergy suspected. Consider Candida & Staph. UTI in premature infants. See existing guidelines on subsequent imaging & prophylaxis. *****Use ceftriaxone if PMA **≥**41 weeks, or if <28d & no hyperbilirubinemia
Age ≥1mth **- non-toxic**	GNB (enteric) (commonly *E. Coli,* Proteus); rarely enterococci	PO Cephalexin 50mg/kg/day Q8H OR PO Amox/ Clav. (Amox) 80-90mg/kg/day Q12H	PO Bactrim (TMP) 8mg/kg/day Q12H	Continue antibiotics at least 7d	10	Oral therapy not preferred in children <2 months, if used, must review in 2-3d & revise Rx accordingly. Avoid using nitrofurantoin to treat febrile infants with UTI (parenchymal & serum concentrations may be insufficient). See existing guidelines on subsequent imaging & prophylaxis.
- toxic		IV/ IM Gentamicin 5-6mg/kg/day Q24H	IV/ IM Ceftriaxone 50mg/kg/day Q12-24H	Continue IV antibiotics at least at least 3d (or 24H afebrile) if non-bacteremic; min 7d if bacteremic. Review dx (Procalcitonin/ acute DMSA may help)	10 *Min. 7d IV total if no PO option & non-bacteremic	

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Presumptive Upper Tract (Pyelonephritis) (cont'd)						
Post-UTI Prophylaxis/ Uroprophylaxis* (only when indicated; see Remarks) see J Urol. 2015;193(3): 963–969, Kidney Res Clin Pract 2019;38(4): 441-454; NEJM 2014;370:2367-76; J Urol. 2010(184);286-291	GNB (enteric) (commonly *E. Coli, Klebsiella pneumoniae*); enterococci	PO Bactrim (TMP) 2-3mg/kg/day Q24H	PO Trimethoprim 2mg/kg/day 24H (if G6PD deficient/ <6 weeks of age) OR PO Nitrofurantoin 2mg/kg/day Q24H (if sulfa allergy/ drug allergy to Bactrim) OR PO Cephalexin 15-20mg/kg/day Q24H	NA	Up to 6yr of age if needed	Refer Renal if unsure. Other indications: high grade vesicoureteral reflux (VUR)* (*see below – "Recommendations for uroprophylaxis in patients with VUR"), urological malformations, high risk of recurrent UTIs
Complicated UTI**	GNB (enteric), enterococci, Pseudomonas, Enterobacter, Serratia, occ. Candida	IV/IM Amikacin 15mg/kg/day Q12-24H OR IV/ IM Ceftazidime 150mg/kg/day Q8H	IV Ciprofloxacin 30mg/kg/day Q8H	Continue IV antibiotics at least 2-3d; review dx	7-14 IV to PO switch: after 2d & patient better	**: refers to UTI due to post-urologic procedure, nosocomial, or in patients with abnormal urinary tract. Remove urinary catheter where possible. Add IV Ampicillin 100mg/kg/day Q6H if Enterococcus suspected. Avoid amikacin if abnormal renal function.

***Recommendations for uroprophylaxis in patients with vesicoureteral reflux (VUR)**

Grade of VUR	Recommendations
Grade I-II	Uroprophylaxis is **generally** not recommended, but may be considered on a case-by-case basis
Grade III	Uroprophylaxis may be considered on a **case-by-case basis**, especially if: • <2yo and girls OR • Concurrent bowel-bladder dysfunction OR • Structural urological abnormalities **For all other cases** - discuss with caregivers weighing (1) benefits vs risk, (2) commitment to compliance, including (3) highlighting the increased risk of antimicrobial resistance (up to 6x higher)
Grade IV-V	Uroprophylaxis may be considered (or surgical intervention if Grade V)

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Presumptive Lower Tract						
Age <12yr	GNB (enteric) (commonly *E. Coli*);	PO Cephalexin 50mg/kg/day Q8H OR PO Bactrim (TMP) 8mg/kg/day Q12H	PO Nitrofurantoin 5-7mg/kg/day Q6H OR PO Trimethoprim 8mg/kg/day Q12H	NA	7	Fever not a feature, local/ voiding symptoms more common (dysuria, frequency, suprapubic pain). No risk of renal involvement.
Age ≥12yr	As Above & *S. saprophyticus*	PO Bactrim (TMP) 8mg/kg/day Q12H	PO Cephalexin 50mg/kg/day Q8H	NA	3 (Bactrim) 7 (Ceph)	
Renal Abscess see Pediatr Surg Int 2003;19:35, Pediatr Infect Dis J 2008;27:1025, Infect Dis North Am 1997;11(3):663-80, Pediatrics 1994;93;261, Urologia 2014; 81 (3): 144-147. Renal abscesses >5cm and perinephric abscesses should be managed with percutaneous drainage together with Abx.						
Intrarenal/ Perinephric	GNB (enteric) (commonly *E. Coli*, *K. pneumoniae*, Proteus), S. aureus, occ. enterococci, Pseudomonas	[(IV/ IM Ceftriaxone 100mg/kg/day Q12-24H OR IV/ IM Ceftazidime 150mg/kg/day Q8H (if nosocomial/ resistant GNB suspected)) WITH/WITHOUT IV Metronidazole 7.5mg/kg/dose Q8H*] OR IV Cefazolin 150mg/kg/day Q8H (if suspect/with evidence of S aureus hematogenous spread)**	IV Ciprofloxacin 30mg/kg/day Q8H WITH/WITHOUT IV Metronidazole 7.5mg/kg/dose Q8H*	As Above	≥21-28 IV to PO switch: after improvement on ultrasound & patient better	Corticomedullary abscess usually associated with underlying urinary tract abnormality (i.e VUR, urinary tract obstruction). Perinephric abscess can occur through hematogenous spread or local spread of a urologic infection e.g. intrarenal abscess rupture. Following catheter removal, Rx can be completed with oral Abx. Add IV Ampicillin 100mg/kg/day if Enterococcus suspected. *If perinephric abscess suspected/ associated with previous GI surgery, malignancy, orodental infection, or renal transplant. **Rarely, cortical abscess can be associated with haematogenous spread from a primary foci (i.e. skin lesions, osteomyelitis, endovascular infections). IV Cefazolin has better *S. aureus* cover; *S. aureus* metastatic infx should be Rx with IV therapy.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
GENITAL TRACT						
Vaginitis/ Vulvovaginitis see MMWR 2021;70(4) & BMJ 2005;330:186. Discharge, odor, irritation/ pain or pruritus are cardinal symptoms; absence of discharge reduces the possibility of positive yield on microbiology. Full history, physical examination & microbiology should be performed before any Rx. Detection of organisms associated with STDs in pre-pubertal children (& non-sexually active post-pubertal adolescents) must always prompt suspicion of sexual abuse, though some STDs may be horizontally acquired in the absence of sexual abuse. OG consultation may be essential especially for resistant or recurrent cases						
Pre-pubertal - commonly non-specific	Irritants (most common); less commonly Group A streptococci, Candida, Shigella, pinworms, foreign bodies; uncommonly STDs (Neisseria, Chlamydia, Trichomonas, Gardnerella, HSV)	Improve local hygiene; Avoid irritants; Sitz bath; WITH/ WITHOUT (PO Amoxicillin 50mg/kg/day Q12H OR (Topical Clotrimazole 1% OR Ketoconazole 2% cream TDS) OR (PO Albendazole x1 & 2-3wk later: ≤2yo: 200mg/dose >2yo: 400mg/dose OR PO Mebendazole x1 & 2wk later: ≥6 months AND ≤10kg: 50mg ≥6 months AND >10kg:100mg (non-formulary))	NA	NA	10 (Amox) 7 (Miconazole)	Bubble baths, soaps, tight clothing/ underwear, poor hygiene (back to front wiping), toilet paper, are predominant irritants. Bleeding always abnormal. Assess for sore throat, diarrhoea, thrush, perianal symptoms, foreign body, sexual abuse/ activity. Antibiotics/ anti-fungals/ anti-parasitics not routinely recommended unless suggestive features of specific infection present.
Post-pubertal - empiric therapy does not exist but Rx heavily reliant on clinical or microbiologic dx	Bacterial Vaginosis: Mixed anaerobes (Gardnerella, Peptostreptococci Mobiluncus, etc.)	PO Metronidazole: <40kg: 7.5mg/kg/dose Q8H ≥40kg: 400mg/dose Q12H	PO Clindamycin: <20kg: 30mg/kg/day Q8H ≥20kg: 300mg/dose Q12H	NA	7	Clinical criteria: fishy odour, pH >4.5, homogeneous thin white discharge, clue cells on microscopy.
	Vulvovaginal Candidiasis -Treatment	Topical Clotrimazole 1% OR Ketoconazole 2% cream TDS	PO Fluconazole: <15kg: 10mg/kg/day Q24H ≥15kg: 150mg/dose Q24H	NA	7 (cream) 1 (Flucon)	Clinical criteria: pruritus, thick cheesy white discharge, pH <4.5.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Vaginitis/ Vulvovaginitis (cont'd)						
Post-pubertal - empiric therapy does not exist but Rx heavily reliant on clinical or microbiologic dx (cont'd) See "Sexually Transmitted Diseases" for treatment of other specific organisms	Vulvovaginal Candidiasis -Recurrent* (Treatment) NEJM 2004;351:876-83	Topical Clotrimazole 1% OR Ketoconazole 2% cream TDS	PO Fluconazole: <15kg: 10mg/kg/day Q72H (at D1, D4 and D7) ≥15kg: 150mg/dose Q72H (at D1, D4 and D7)	NA	7-14 (cream) 3 doses (Flucon)	*Definition: ≥4x/year Risk factors: antibiotics use, contraceptive use, DM, immunodeficiency, mechanical irritation, sexual transmission. Reassess at 6mth; most recommend chronic suppression for 6mth. Consider non-albicans or fluconazole-resistant VVC.
	Vulvovaginal Candidiasis -Recurrent* (Prophylaxis) see Am Fam Phy 2000; 61(11):3306-12	PV Clotrimazole vaginal tablet 200mg 2x/week	PO Fluconazole: <15kg: 10mg/kg/day 1x/week ≥15kg: 150mg/dose 1x/week	NA	6mth	
Pelvic Inflammatory Disease see: MMWR 2021; 64(3), UK National Guideline for Management of PID 2019, & MMWR 2020; 69(50): 1911-6						
Mild-moderate (Outpatient)	Polymicrobial (Neisseria gonorrhoeae, Chlamydia trachomatis, Bacteroides, GNB (enteric), GBS, Gardnerella)	IV/IM Ceftriaxone 50mg/kg/dose x1 (max 500mg) PLUS PO Doxycycline 4mg/kg/day Q12H (not licensed in <8yr old) PLUS PO Metronidazole: <40kg: 7.5mg/kg/dose Q8H ≥40kg: 400mg/dose Q12H	PO Azithromycin x1: 40mg/kg/dose (max 2g) PLUS IV/IM Gentamicin x1: <40kg: 5-7mg/kg/dose (max 240mg) ≥40kg: 240mg) PLUS PO Metronidazole: <40kg: 7.5mg/kg/dose Q8H ≥40kg: 400mg/dose Q12H	Continue IV antibiotics at least 2-3d	14 1 dose (Ceftriax)	Exclude pregnancy, appendicitis; assess for tubo-ovarian abscess. Consider addition of metronidazole for additional anaerobic cover. Quinolones should be avoided as 1st line in view of increasing quinolone-resistant *N. gonorrhoeae* worldwide. Oral Rx can be with doxycycline & metronidazole only for at least 14d.
Hospitalized	Polymicrobial (Neisseria gonorrhoeae, Chlamydia trachomatis, Bacteroides, GNB (enteric), GBS, Gardnerella)	IV/ IM Ceftriaxone 50mg/kg/day Q12-24H PLUS PO Doxycycline 4mg/kg/day Q12H (not licensed in <8yr old) PLUS IV Metronidazole 7.5mg/kg/dose Q8H	IV Clindamycin 40mg/kg/day Q6H PLUS IV Gentamicin 5mg/kg/day Q24H	Continue IV antibiotics at least 2-3d	14 IV to PO switch: after 2d & patient better	

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Epididymitis/ Epididymo-orchitis see Am Fam Phy 2009; 79(7): 583-7, MMWR 2015; 64(3)						
Pre-pubertal (Age <14 years)	GNB (enteric) (commonly *E. Coli,* Proteus); Less commonly Ureaplasma spp., *Mycoplasma genitalium, Mycobacterium tuberculosis*, and *Brucella* spp.	PO Cephalexin 50mg/kg/day Q8H OR PO Bactrim (TMP) 8mg/kg/day Q12H	PO Trimethoprim 8mg/kg/day Q12H OR PO Ciprofloxacin 30mg/kg/day Q12H	NA	1 dose (Ceftriax, Azithro) 10 (Cephalex, Bactrim, Cipro, Doxy)	Orchitis usually occur with concurrent epididymitis. Consider other non-infectious causes (i.e. post-infectious inflammatory reaction to pathogens, vasculitides); and viral causes (i.e. mumps orchitis). Symptoms should improve within 48-72H, if not better, consider other causes of scrotal pain.
Post-pubertal (Age ≥14 years)	*N. gonorrhoeae* and *C. trachomatis*	IV/IM Ceftriaxone 50mg/kg/dose (max 500mg) x1 PLUS PO Azithromycin 20mg/kg/dose (max 1g) x1	PO Doxycycline 4mg/kg/day Q12H			
Balanitis/ Balanoposthitis see Int J STD AIDS 2014; 25(9): 615-26; Genitourin Med 1996; 72: 155-9						
Balanitis/ Balanoposthitis	Group A Streptococcus, mixed anaerobes (including *Gardnerella vaginalis), S.* aureus. Less commonly *Trichomonas vaginalis*, HSV, HPV, syphilis, *Mycoplasma genitalium*, scabies.	Mild-moderate: Topical Polybamycin (Bacitracin, Neomycin, Polymyxin B) ointment 1 app BD Severe: PO Cloxacillin 50mg/kg/day Q6H OR *PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H (only if suspect anaerobic infection)	Mild-moderate: Topical Tetracycline 3% 1 app BD Severe: PO Clindamycin 30mg/kg/day Q8H	NA	7	Genital hygiene and gentle cleaning are key. Treatment is usually topical, consider oral antibiotics only in severe cases. Most commonly Group A Streptococcus isolated in uncircumcised children. Higher risk in uncircumcised, possibly due to poorer hygiene and aeration, or irritation by smegma. *Consider additional anaerobic cover only in presence of foul-smelling sub preputial inflammation and discharge. Evaluate for other STDs if sexually active.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Candida Balanitis/ Balanoposthitis	Candida spp., usually C. albicans.	(Topical Clotrimazole 1% cream OR Ketoconazole 2% cream BD) WITH/WITHOUT Topical Hydrocortisone 1% cream 1 app BD	If severe/ refractory: PO Fluconazole 3-6mg/kg/day Q24H (max 200mg)	NA	7	May present with white curd-like exudate. Send swab for fungal smear and cultures. More common in patients with DM, and uncircumcised. Evaluate for DM if Candida balanitis in healthy male. May consider adding hydrocortisone cream if inflammation present.
Prostatitis see Am Fam Phy 2016; 93(2): 114-120; Clin Infect Dis 2010; 50(12): 1641-52; Chemother 2003; 49: 269-79						
Acute Prostatitis	Most commonly *E. coli*, other GNB (*Klebsiella Enterobacter, Proteus, Serratia spp, P. aeruginos*a) and *Enterococcus.* Rarely *Salmonella, Candida* and *Cryptococcus spp*. (in immune-compromised.	PO Cephalexin 50mg/kg/day Q8H OR PO Amoxicillin/ Clav. (Amox) (Amox) 50mg/kg/day Q12H OR PO Bactrim (TMP) 8mg/kg/day Q12H	PO Ciprofloxacin 30mg/kg/day Q12H	NA	≥10-14 (up to 4-6wks if severe/ still symptomatic at 2 wks)	Risk factors include: GU infection (epididymitis, Orchitis, urethritis, UTI), phimosis, high-risk sexual behavior, hx of STDs, immunocompromised, prostate manipulation, urethral stricture, BPH. Assess for N. gonorrhoeae and C. trachomatis if sexually active. Trimethoprim and Fluoroquinolones provide better prostate penetration, as compared to beta-lactams.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Genital Herpes Infection see Red Book 2015; MMWR 2021; 64(3); WHO 2016						
First episode	Herpes simplex virus (HSV-1 and HSV-2)	PO Acyclovir 60-80mg/kg/day Q8H (max 400mg/dose)	PO Valacyclovir 40mg/kg/day Q12H (max 1000mg/dose)	NA	7-10	Treat within 6 days onset; shortens duration and viral shedding by 3-5d. Assess for concomitant STDs. Consider acyclovir-resistant HSV if lesions persist/recur during treatment.
Genital Herpes Recurrent (Treatment	Herpes simplex virus (HSV-1 and HSV-	PO Acyclovir 60-80mg/kg/day Q8H (max 400mg/dose)	PO Valacyclovir 40mg/kg/day Q12H (max 1000mg/dose)	NA	5	Treat within 1 day onset or during prodrome; shortens duration by 1d. Consider acyclovir-resistant HSV if lesions persist or recur during receipt of antiviral treatment.
Recurrent* (Prophylaxis)		PO Acyclovir 40mg/kg/day Q12H (max 400mg/dose)	PO Valacyclovir 20mg/kg/dose Q24H (max 1000mg/dose)	NA	6-12 months	*Definition: ≥4-6x/year; severe symptoms/episodes causing distress. Suppressive therapy reduces frequency of recurrence by 70-80%, and improves quality of life. Reassess the need for continued suppressive therapy periodically (i.e. every 6 months) as recurrences usually become less frequent and severe with time.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Sexually Transmitted Diseases see CDC STD guidelines 2021 & ACOG 2014. Baseline FBC, LFTs, UECrs, as well as screening for *Chlamydia trachomatis, Neisseria gonorrhoeae,* VP3, *Treponema pallidum*, Hepatitis B virus, Hepatitis C virus and HIV should be performed for victim prior to treatment commencement (should also be performed for the assailant whenever possible). Refer to inpatient Sexual Assault Workflow for details of STI screening. **Antimicrobial prophylaxis is recommended in post-pubertal children** who present within 72H of sexual assault with an empiric regimen to prevent chlamydia, gonorrhea, and trichomoniasis (additional for females).						
Post-Sexual Assault Prophylaxis	*Chlamydia trachomatis, Neisseria gonorrheae, Trichomonas vaginalis*	IV/IM Ceftriaxone 50mg/kg/dose (max 500mg) STAT PLUS PO Azithromycin 20mg/kg/dose (max 1g) STAT PLUS (if female) PO Metronidazole <45kg: 7.5mg/kg/dose Q8H x 7 days ≥45kg: 2g/dose STAT)	PO Azithromycin 40mg/kg/dose (max 2g) STAT PLUS IV/IM Gentamicin ≥40kg: 240mg STAT <40kg: 5-7mg/kg/dose (max 240mg) STAT PLUS PO Metronidazole <45kg: 7.5mg/kg/dose Q8H x 7 days ≥45kg: 2g/dose STAT)	NA	1 dose (Azithro, Ceftriax, Metronidaz, Genta); 7 (Metro if not given as single dose)	**Refer ID if unsure.**
	Refer to "Specific organisms" below for specific diagnostic tests and for Human immunodeficiency virus (HIV), Hepatitis B & C viruses) and Human Papillomavirus (HPV) (females). May consider prophylaxis for *Treponema pallidum* (Syphilis) if high risk assailant (see: "Specific organisms"). **Evaluate need for HIV prophylaxis (see APPENDIX 3) and Hep B Prophylaxis (see APPENDIX 4) according to individual's risk. Refer ID if unsure.** Emergency oral contraceptives should also considered. Within 72H of sexual assault: Levonorgestrel (Postinor-2) 1.5mg STAT OR Within 120H of sexual intercourse: Ulipristal Acetate 30mg					

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Sexually Transmitted Diseases (cont'd) **(Genital Infections)**						
(Specific organisms)	*Chlamydia trachomatis*	PO Azithromycin 20mg/kg/dose (max 1g) STAT	PO Doxycycline 4mg/kg/day Q12H (max 100mg/dose) (if not pregnant)	NA	1 dose (Azithro); 7 (Doxy,	Send vaginal/endocervical swab for *Chlamydia trachomatis* PCR.
	Neisseria gonorrhoeae (see PLoS ONE 14(4): e0213312; Clin Microbiol Infect 2020;26:207)	IV/IM Ceftriaxone 50mg/kg/dose (max 500mg) STAT	PO Azithromycin 40mg/kg/dose (max 2g) STAT PLUS IV/IM Gentamicin ≥40kg: 240mg STAT <40kg: 5-7mg/kg/dose (max 240mg) STAT	NA	1 dose (Ceftriax, Azithro, Genta)	*Neisseria gonorrhoeae* PCR and *Neisseria gonorrhoeae* c/s should be sent for genital sites (urethral/vaginal/ endocervical) while *Neisseria gonorrhoeae* c/s should be sent for extragenital sites
	Trichomonas vaginalis (see Curr Opin Infect Dis. 2020; 33(1):73–77)	PO Metronidazole <45kg: 7.5mg/kg/dose Q8H ≥45kg: 2g/dose STAT For ≥45kg: If Rx failure with single dose Metronidazole: 400mg/dose Q12H x7d	NA (Refer ID)*	NA	1 dose (Metro) 7 (Metro if not given as single dose)	Clinical criteria: copious foamy discharge, pH >4.5. Send vaginal swab for VP3. *Only nitroimidazoles proven effective. Intra-vaginal boric acid or paromomycin (not available in KKH) have been used but ideal dosing regimen unknown.
	Treponema pallidum (Syphilis) (see N Engl J Med 2005;353:1236-44,	IM Benzathine Penicillin G 50,000U/kg/dose (max 2.4 MU) STAT (preferred) OR PO Azithromycin 40mg/kg/dose (max 2g) STAT (if intolerant to IM Benzathine Penicillin G)	PO Doxycycline 4mg/kg/day Q12H (max 100mg/dose) X 14d OR IV/IM Ceftriaxone 50mg/kg/dose Q12-24H (max 1g/day) x 10-14d	NA	1 dose (Pen G, Azithro); 14 (Doxy); 10-14 (Ceftriax)	Send blood for *Treponema pallidum* total antibody (CMIA) at baseline & at 6 mth. Data suggests single dose azithromycin as effective as IM Benzathine Penicillin G but resistance has been reported. Limited evidence to suggest effectiveness of Ceftriaxone, optimal dose and duration remain unknown

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Sexually Transmitted Diseases Prophylaxis (cont'd) Based on MOH Communicable Disease Surveillance Singapore 2018 report, current HIV incidence is 7.8 per 100,000 population, highest at 12.1 per 100,000 population (50-59 year old age group). Hepatitis B incidence is 1 per 100,000 population. Hepatitis C incidence is 0.2 per 100,000 population						
(Specific organisms)	Human immunodeficiency virus (HIV) (see CDC nPREP guidelines 2016; BASHH PEPSE guidelines 2015; US HHS ARV Guidelines Appendix D: Dec 2019; NEJM 2018; 79: 979; AIDS 2020 Abstr OAXLB0102)	**<20kg:** Refer to alternative therapy **≥20 – 35kg:** PO Dolutegravir 50mg Q24H PLUS PO Lamivudine 4mg/kg/dose Q12H (max 150mg/dose) PLUS PO Zidovudine 240mg/m^2/dose Q12H (max 300mg/dose) **≥35 kg:** (PO Dolutegravir 50mg Q24H OR PO Lopinavir/ Ritonavir (Kaletra®) 400mg/100mg Q12H)* PLUS PO Tenofovir 300mg/ Emtricitabine 200mg (Truvada®) 1 tab Q24H *Kaletra®: Lopinavir 200mg/Ritonavir 50mg/ tab (if stock disruption of Dolutegravir. Kaletra® tablets should be taken whole and NOT be crushed, consider solution if unable to swallow)	PO Lopinavir/Ritonavir (230mg/57.5mg)/m^2/dose (Kaletra®) Q12H (max 2 Kaletra®* ADULT tab/dose) PLUS PO Lamivudine 4mg/kg/dose Q12H (max 150mg/dose) PLUS PO Zidovudine 240mg/m^2/dose Q12H (max 300mg/dose) *Kaletra®: Lopinavir 200mg/Ritonavir 50mg/ tab (if stock disruption of Dolutegravir. Kaletra® tablets should be taken whole and NOT be crushed, consider solution if unable to swallow)	NA	28	**Evaluate need for HIV PEP (see APPENDIX 3).** **Refer ID if uncertain, or for counselling if planning to start HIV PEP**. Should be initiated as soon as possible, ideally within 72H, no longer useful if exposure >7d. Perform baseline FBC, LFTs & sCr. Repeat HIV serology at 6 weeks, 3-4 mth and 6 mth. First-line therapy more well-tolerated and associated with fewer SE. US DHHS recommends Dolutegravir as preferred ARV for all trimesters of pregnancy; and alternative for females who are trying to conceive because of small but increased risk of neural tube defects in the 1st 4 – 6 weeks' post-conception. Kaletra® associated with hyperlipidemia (↑TG) (20-40%). Lamivudine well tolerated but pancreatitis (more in paeds). Zidovudine associated with bone marrow suppression (anemia, neutropenia). Repeat FBC, LFT, renal panel in 2 weeks after starting HIV PEP.
	Hepatitis B virus	Refer to APPENDIX 4 for Hep B Prophylaxis		NA	NA	Send HepBsAg, Anti-HBs, anti-HB core total antibody at baseline

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Sexually Transmitted Diseases Prophylaxis (cont'd) **see** CDC STD guidelines 2015, MMWR Recomm Rep 2014;63(No. RR-05)						
(Specific organisms)	Hepatitis C virus	No available prophylaxis		NA	NA	If assailant known to be Hep C positive, to discuss with Gastroenterologist. Repeat Hep C Ab at 3-4 mth (if high risk assailant) and 6 mth (can omit if assailant HCV neg and no major risk factors)
	Human papillomavirus (HPV) (FEMALES ONLY)	Cervarix (2-valent) (HPV-2): 9 to <15 years: 2 doses at 0, 5 to 13 months ≥ 15 years: 3 doses at 0, 1-2.5, 5-12 months	Gardasil (4-valent) 9 to <14 years: 2 doses at 0, 6 months ≥ 14 years: 3 doses at 0, 2, 6 months OR Gardasil-9 (9-valent) 9 to <15 years: 2 doses at 0, 5 to 13 months ≥ 15 years: 3 doses at 0, 2, 6 months	NA	NA	HPV vaccine will not protect against progression of infection already acquired or promote clearance of the infection, but the vaccine protects against vaccine types not yet acquired. HPV vaccine should be started for females ≥ 9 years in Singapore (Cervarix given in HPB school-based program). If patient has already received 1 dose, offer dose 2 if > 5 months from 1st dose. If not vaccinated, HPV-2 (Cervarix) vaccine (100% subsidized for Singapore Citizens; 50% subsidized for Permanent Residents) recommended for females aged 9–26 years. Administer at time of initial examination. If there are financial concerns, to await vaccination to be done in HPB school-based program. Observe for at least 15 min post-vaccination for syncope

APPENDIX 3: RECOMMENDATIONS FOR NEED FOR HIV POST-EXPOSURE PROPHYLAXIS see Pediatrics 2003; 111 (6): 1475-89

PEP is not recommended if exposure >7d ago, exposed person refused PEP or if person is unwilling or unable to commit to 28 days of therapy and appropriate follow-up.
HIV PEP should be initiated as soon as possible, ideally within 72H, no longer useful if exposure >7d. Offer prophylaxis if high risk factors present.
High risk factors: male homosexual activity, injectable drug use, blood transfusion/blood product infusion before 1985, repeat abuse, multiple assailants, oral/vaginal/anal penetration/trauma and sexual activity with a member of a high-risk group and high risk exposure (see below), and if assailant known/ high risk of HIV infection.
Refer ID if uncertain or for counselling if planning to start HIV PEP.
HIV incidence is 7.8 per 100,000 population, highest at 12.1 per 100,000 population (50-59 yr old age group) (MOH 2018 communicable diseases report)

<table>
<tr><th colspan="2" rowspan="2">Exposure Type</th><th colspan="5">HIV Infection Status of Source</th></tr>
<tr><th>Not HIV infected</th><th>HIV status unknown (risk factors* unknown)</th><th>HIV status unknown: low risk (known not to have risk factors*)</th><th>HIV status unknown: high risk (≥1 risk factors*)</th><th>HIV-infected</th></tr>
<tr><td rowspan="3">No risk identified</td><td>Cutaneous exposure (fluid on intact skin, bite without break in skin)</td><td colspan="5" rowspan="3">No PEP</td></tr>
<tr><td>Mucous membrane exposure (kissing)</td></tr>
<tr><td>Percutaneous exposure (superficial scratch with sharp object, including needle)</td></tr>
<tr><td>Low to intermediate</td><td>Cutaneous exposure (skin with compromised integrity)</td><td>No PEP</td><td colspan="4">Consider PEP</td></tr>
<tr><td rowspan="2">Low</td><td>Mucous membrane exposure (oral sex, human milk, splash to eye/mouth)</td><td rowspan="2">No PEP</td><td colspan="4" rowspan="2">Consider PEP</td></tr>
<tr><td>Percutaneous exposure (puncture wound with solid needle, puncture wound with hollow needle without visible blood, body piercing, bite with break in skin)</td></tr>
<tr><td rowspan="2">Intermediate</td><td>Mucous membrane exposure (receptive vaginal sex with trauma)</td><td rowspan="2">No PEP</td><td colspan="4" rowspan="2">Consider PEP</td></tr>
<tr><td>Percutaneous exposure (puncture wound with hollow needle with visible blood)</td></tr>
<tr><td rowspan="3">High</td><td>Cutaneous exposure (traumatic skin wound with bleeding in donor/recipient)</td><td rowspan="3">No PEP</td><td colspan="3" rowspan="3">Consider PEP</td><td rowspan="3">Recommend PEP</td></tr>
<tr><td>Mucous membrane exposure (receptive anal intercourse, traumatic sex with blood – sexual assault)</td></tr>
<tr><td>Percutaneous exposure (puncture wound with large-bore hollow needle with visible blood on needle, or needle recently used in source patient artery/vein)</td></tr>
</table>

APPENDIX 4: RECOMMENDATIONS FOR HEPATITIS B PROPHYLAXIS see CDC Guidelines 2021; MMWR 2015; 64:3, BASHH Guidelines 2017

Hepatitis B seroprevalence: 1.3% (2021, unpublished data)

Send HepBsAg, Anti-HBs (Hepatitis B immunity profile) at baseline

EXPOSED PERSON	TREATMENT IF SOURCE IS		
	HBsAg-Positive[&]	**HBsAg-Negative**	**Unknown or Not Tested**
Unimmunized/ Partially immunized	HBIG[#] x1 dose **AND** Hepatitis B vaccine x1 dose Thereafter, complete primary Hepatitis B series as per schedule (x 3 doses)^	Hepatitis B vaccine x1 dose Thereafter, complete primary Hepatitis B series as per schedule (x 3 doses)^	Hepatitis B vaccine x1 dose Thereafter, complete primary Hepatitis B series as per schedule (x 3 doses)^
Previously immunized (completed 3 doses of Hepatitis B vaccine)	Hepatitis B vaccine x1 dose^ **AND** HBIG[#] x1 dose **IF** exposed person's anti-HBs is <10 IU/mL	No treatment	Hepatitis B vaccine x1 dose^^

[&]: If the source is known to be HBs-Ag positive, do not discharge the patient (exposed person) until his/ her anti-HBs levels are out.

	Hepatitis B vaccine series: at 0, 1-2 and 4-6 months
#	Dose of HBIG, 0.06 mL/kg, intramuscularly. HBIG ideally administered within 24 – 48 hours, and not later than 7 days (for all exposures). For mucosal/sexual exposure, HBIG can be considered up till day 14 post-exposure (i.e. after day 8 to day 14) but weak recommendation (MMWR 2015; 64:3; NEJM 1975; 21;293). If in doubt, discuss with ID.
^	IIf received HBIG, HepBsAg and anti-HBs should be done when passively acquired antibody from HBIG is no longer detectable after 6 months and 1 month after last Hep B dose, whichever is later should be done when passively acquired antibody from HBIG is no longer detectable after 6 months and 1 month after last Hep B dose, whichever is later.
^^	Check HepBsAg and anti-HBs 1 month after booster dose. If anti-HBs <10 mIU/mL, 2 additional vaccine doses should be administered (i.e. complete Hepatitis B vaccine series of 3 doses) and recheck HepBsAg and anti-HBs 1 month after last dose.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
RESPIRATORY SYSTEM						
Upper Respiratory Tract Infection see Clin Infect Dis 2019; 68(6): e1-47; PHE guidance on influenza (Jan 2019); Therapeutic Guidelines Australia 2014						
URTI	Respiratory viruses, including Influenza	No Antibiotics required; Consider PO Oseltamivir only in high risk Influenza-positive patients: PO Oseltamivir: PMA >40 weeks: 3mg/kg/DOSE Q12H OR (per DOSE, Q12H), **if ≥ 1yo:** ≤ 15kg: 30mg >15kg to 23kg: 45mg >23kg to 40kg: 60mg > 40kg or Adult: 75mg	NA	NA	5	**See Appendix 7 for neonatal dosing.** Consider PO Oseltamivir only in high risk patients (age <2yr, severe, complicated, or progressive illness; or at higher risk for influenza complications eg. immunosuppression, chronic pulmonary, cardiac, neurological, hepatic, renal disease). To be given as early as possible, preferably within 48 hrs of illness onset.
Bronchiolitis/ Bronchitis see Lancet 2006;368:312, Pediatr 2006;1774:1793 & Am Fam Physician 2010;1345:1350; use in conjunction with "KKH Bronchiolitis Pathway" for children <2yr						
Age ≤5yr	RSV, influenza, para-influenza, adenovirus, metapneumovirus; rarely Bordetella, Mycoplasma	No Antibiotics required; Oxygen or humidified air WITH/ WITHOUT (Hood Nebulised Adrenaline or Salbutamol (for <2yr) OR MDI Salbutamol (for ≥2yr))	NA	NA	NA	Antibiotics may considered in children with prolonged symptoms with suspicion of secondary bacterial infection (see community-acquired pneumonia below), or infection with atypical organisms (esp. pertussis in unvaccinated, paroxysmal cough ≥3 wk, exposure to proven pertussis). Avoid expectorants, mucolytics.
Age >5yr (see Redbook 2022)	As Above, & *Bordetella pertussis, Mycoplasma pneumoniae, Chlamydia pneumoniae*	No Antibiotics required; Decongestants, antihistamines WITH/ WITHOUT MDI Salbutamol	NA	NA	NA	

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Community Acquired Pneumonia see CID 2011;53:e25, Thorax 2011;66:ii1 & NEJM 2002; JAMA 2021:326(17), JAMA Pediatr. 2021;175(5); JAMA Pediatr. 2022;176(3); RedBook 2022 **Use in conjunction with "KKH Pneumonia Pathway" for children**. Distinguishing between pneumonitis (interstitial pattern) & alveolar pneumonia on CXR may still be helpful. Always measure oxygen saturation & provide oxygen if required. Review vaccination history, childcare attendance, exposure to adults with chronic cough; always consider TB & isolate all patients if suspected to have TB.						
Age <1mth	GBS, Listeria, *E. Coli*; rarely Chlamydia trachomatis, syphilis, CMV, TB	IV Ampicillin PLUS IV Gentamicin	IV Ampicillin* PLUS IV Cefotaxime*	Continue IV antibiotics at least 2-3d (CRP may help predict bacterial pneumonia)	14 IV to PO switch: after 2d & patient better	**See Appendix 7 for neonatal dosing.** *Consult ID/Allergy if penicillin allergy suspected. If afebrile, staccato cough, no respiratory distress, may Rx empirically for Chlamydia & await results. Always perform full septic workup for febrile infants.
Age 1-3mth - non-toxic/ afebrile	RSV, influenza, para-influenza, adenovirus, metapneumovirus, *S. pneumoniae,* Chlamydia, Bordetella, *S. aureus*	No Antibiotics required (if suspect/ confirm viruses); PO Clarithromycin 15mg/kg/day Q12H (if suspect Chlamydia, Bordetella)	PO Azithromycin 10mg/kg/day Q24H	NA	7-10 (Clarithro) 3 (Azithro)	See specific organism Rx below. Evidence for duration of Rx not strong.
Age 1-3mth - toxic/ febrile	RSV, influenza, para-influenza, adenovirus, metapneumovirus, *S. pneumoniae,* Chlamydia, Bordetella, *S. aureus*	(IV Ampicillin PLUS IV Cloxacillin) WITH/ WITHOUT PO Clarithromycin 15mg/kg/day Q12H	(#IV Ceftriaxone 100mg/kg/day Q12-24H OR IV Clindamycin 40mg/kg/day Q6H) WITH/ WITHOUT PO Azithromycin 10mg/kg/day Q24H	Continue IV antibiotics at least 2-3d	7-14 IV to PO switch: after 2d & patient better	As Above. Macrolides can be added if no response after 48-72h. Oral step-down dose for amoxicillin is 80-90mg/kg/day Q8-12H. If dose volume of PO Amox suspension for Q12H dosing is large and intolerable, consider Q8H. #Refer to Appendix 2: Allergy algorithm for penicillin allergy. Consult ID/Allergy if penicillin allergy suspected.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Community Acquired Pneumonia (con'td)						
Age 3mth-5yr - non-toxic/ mild-moderate	*S. pneumoniae*, *M. catarrhalis*, *H. influenzae* (non-type b), Mycoplasma, Chlamydia, Respiratory viruses	PO Amoxicillin 80-90mg/kg/day Q8-12H (if suspect S. pneu.) OR PO Clarithromycin 15mg/kg/day Q12H (if suspect Mycoplasma/ H. influenzae) (If influenza suspected/ confirmed, start oseltamivir within 48h of illness for <2yr)	PO Cefuroxime 30mg/kg/day Q12H (if penicillin allergy suspected, but non-anaphylactic/ severe and suspect S. pneu.) OR PO Azithromycin 10mg/kg/day Q24H (if suspect Mycoplasma/ H. influenzae)	If Viral etiology is confirmed on NPA: Stop antibiotics OR limit to 5 days antibiotics if ALL the following criteria are met: 1.Clinically improving, 2. CRP <50 (if done), 3. No consolidation on CXR, 4. No HD/CICU admission, 5. No clinical/radiologic features suggestive of secondary bacterial infection, 6. No significant co-morbidities (e.g. chronic lung disease, congenital heart disease, immune deficiency, neuromuscular disease etc.)	5-10 (Amox, Cefurox) 7-10 (Clarithro) 3 (Azithro) Complicated pneumonia (effusion, empyema, necrotizing pneumonia, lung abscess) will need longer duration: Discuss with Respiratory/ID	Dual empiric amoxicillin/ clarithromycin discouraged. If prior antibiotics have been given, ensure appropriate dosing for 48-72 hrs, followed by reassessment and switch to macrolide (if prior amoxicillin use and suspect atypical organisms), augmentin (if prior amoxicillin use and suspect less susceptible typical organisms) or amoxicillin (if prior macrolide use and suspect typical bacterial pneumonia). Consult ID/Allergy if penicillin allergy suspected

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Community Acquired Pneumonia (con'td)						
Age 3mth-5yr - severe (non-HD/ICU), or cannot tolerate PO	As Above & *S. aureus* (*H. influenzae* type b rare now with widespread vaccination)	(IV Ampicillin 200-300 mg/kg/day Q6H (300 if complicated) OR IV/ IM Ceftriaxone 100mg/kg/day Q12-24H) WITH/ WITHOUT PO Clarithromycin 15mg/kg/day Q12H (if not better after 48-72H of prior Ampicillin Rx))	#IV/PO Levofloxacin[ID] 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo)	Continue IV antibiotics at least 2-3d (CRP may help. Urine pneumo. antigen cannot distinguish colonization from infection)	7-10 (Amp, Ceftriax, Clarithro, Levo) (3-6wk if complicated) IV to PO switch: after 2d & patient better	Complicated pneumonia refers to those who require invasive or non-invasive ventilation, or have significant effusion/ empyema. **Add IV Cloxacillin 100mg/kg/day esp. if <1yr & Staph suspected.** #Refer to Appendix 5: Allergy algorithm for penicillin allergy. Consult ID/Allergy if penicillin allergy suspected
- hospitalized, severe (HD/ICU)	As Above & *S. aureus.* (*H. influenzae* type b rare now with widespread vaccination)	((IV Ampicillin 300 mg/kg/day Q6H OR IV/ IM Ceftriaxone 100mg/kg/day Q12-24H) PLUS PO Clarithromycin 15mg/kg/day Q12H) WITH/ WITHOUT PO Oseltamivir (see doses below)	#IV/PO Levofloxacin[ID] 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo) WITH/ WITHOUT PO Oseltamivir (see doses below)			

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Community Acquired Pneumonia (con'td)						
Age >5yr **- non-toxic/ mild-moderate**	*Mycoplasma pneumoniae*, *S. pneumoniae*, nasolacrimal duct obstruction Chlamydia	PO Clarithromycin 15mg/kg/day Q12H (if suspect Mycoplasma) OR PO Amoxicillin 80-90mg/kg/day Q8-12H (if suspect S. pneu./ not better after 48-72H of prior Macrolides Rx)	PO Azithromycin 10mg/kg/day Q24H (if suspect Mycoplasma) OR PO Cefuroxime 30mg/kg/day Q12H (if penicillin allergy suspected, but non-anaphylactic/ severe and suspect S. pneu.)	If Viral etiology is confirmed on NPA: Stop antibiotics OR limit to 5 days antibiotics if ALL the following criteria are met: 1.Clinically improving, 2. CRP <50 (if done), 3. No consolidation on CXR, 4. No HD/CICU admission, 5. No clinical/radiologic features suggestive of secondary bacterial infection, 6. No significant co-morbidities (e.g. chronic lung disease, congenital heart disease, immune deficiency, neuromuscular disease etc.)	7-10 (Clarithro) 3 (Azithro) 5-10 (Amox, Cefurox) Complicated pneumonia (effusion, empyema, necrotizing pneumonia, lung abscess) will need longer duration: Discuss with Respiratory/ID	**Macrolides 1st line**. Consider amoxicillin if fail to respond to macrolide after 48-72H (review compliance, dose); may use IV ampicillin if hospitalized/ intolerant of oral med - dose see below. **Dual amox/ claritho use highly inappropriate & strongly discouraged, unless awaiting 48H blood cultures or mycoplasma results.** #Consult ID/Allergy if penicillin allergy suspected.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Community Acquired Pneumonia (con'td)						
Age >5yr **- severe (non-HD/ICU), or cannot tolerate PO** (see Arch Dis Child 2011;96:482)	As Above & *S. aureus*; rarely *Burkholderia pseudomallei*	***PO Clarithromycin 15mg/kg/day Q12H WITH/ WITHOUT (IV Ampicillin 200-300 mg/kg/day Q6H OR IV/ IM Ceftriaxone 100mg/kg/day Q12-24H (if not better after 48H of prior Ampicillin Rx))	#PO/IV Levofloxacin[ID] 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo) OR (PO/IV Doxycycline 4mg/kg/day Q12H (if G6PD deficient) PLUS IV/IM Ceftriaxone 100mg/kg/day Q12-24H))	Continue IV antibiotics at least 2-3d	7-10 (Amp, Ceftriax, Clarithro, Clinda, Levo, Doxy) (3-6wk if complicated)	Source control (e.g. drainage) may be essential for cure. *If suspect melioidosis: 1st line: Ceftazidime + Ampicillin +/- Clarithromycin/Erythromycin. **Add clindamycin if lung necrosis suspected or documented risk of MRSA.** Oseltamivir usually used in immunocompromised/ high risk patients only. #Refer to Appendix 5: Allergy algorithm of pneumonia pathway for penicillin allergy; Consult ID/Allergy if penicillin allergy suspected.
Age >5yr **- severe (HD/ICU)**	As Above & *S. aureus*; rarely *Burkholderia pseudomallei*	(***IV Erythromycin 50mg/kg/day Q6H PLUS (IV Ampicillin 300mg/kg/day Q6H OR IV/ IM Ceftriaxone* 100mg/kg/day Q12-24H)) WITH/ WITHOUT PO Oseltamivir (see doses below)	#IV/PO Levofloxacin[ID] 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo) WITH/ WITHOUT PO Oseltamivir (see doses below)	Continue IV antibiotics at least 2-3d	7-10 (Amp, Ceftriax, Clinda, Levo) 14 (Erythro) (3-6wk if complicated) 5 (Oseltamivir)	Source control (e.g. drainage) may be essential for cure. *If suspect melioidosis: 1st line: Ceftazidime + Ampicillin + Erythromycin. **Add clindamycin if lung necrosis suspected or documented risk of MRSA**. Oseltamivir usually used in immunocompromised/ high risk patients only. #Consult ID/Allergy if penicillin allergy suspected.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Community Acquired Pneumonia (con'td)						
Aspiration Pneumonia (see Pediatr Clin N Am 2005;52:1059)	Polymicrobial (aerobic & anaerobic Streptococci, other anaerobes, *S. pneumoniae*, *S. aureus*, Pseudomonas, *H. influenzae* etc.)	IV Amoxicillin/ Clav. 120mg/kg/day (Amox: 100mg/kg/day) Q8H WITH/ WITHOUT IV Ampicillin 100mg/kg/day Q6H*	IV Ciprofloxacin 30mg/kg/day Q8H PLUS IV Clindamycin 40mg/kg/day Q6H	Continue IV antibiotics at least 2-3d.	5-7	PO Amoxicillin/ Clav. (Amox) 80-90mg/kg/day Q12H can be considered if very well and non-toxic. *if strong suspicion for *S. pneumoniae* infection

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Community Acquired Pneumonia (con'td)						
(Specific organisms)	*Mycoplasma pneumoniae* (Mycoplasma pneumoniae PCR positive or serology ≥ 320) (see Pediatr Infect Dis J 2008; 27:776-782 & J Antimicrob Chemother 1999; 44:141-44)	PO Clarithromycin 15mg/kg/day Q12H (preferred) OR PO Azithromycin 10mg/kg/day Q24H	#IV/PO Levofloxacin[ID] 20mg/kg/day Q12H (<5yo); 10mg/kg/day Q24H (≥5yo) OR PO Doxycycline 4mg/kg/day Q12H (if G6PD deficient)	NA	7-10 (Clarithro, Doxy, Levo) 3 (Azithro)	Clarithromycin is preferred over Azithromycin; while azithromycin may be more cost-effective, better compliance with a shorter treatment course, the slow elimination and sub-inhibitory tissue concentrations have been associated with increasing resistance in *S. pneumoniae.*
		• Consider **resistant/ refractory *Mycoplasma pneumoniae* pneumonia, especially if recent travel history to places where high rates (>50-80%) of resistance present e.g. China, Japan, Korea);** and after 1. completing 3 to 4 days of adequately dosed macrolide therapy AND 2. fever remains hectic (i.e. no improvement in afebrile intervals & no other cause for fever is found). Consider referral to Infectious Diseases or Respiratory depending on potential respiratory complications. (see Clin Infect Dis 2012;55:1642–9; PIDJ 2013; 32: 1396-9; J Korean Med Sci. 2018;33:e268; Ann Acad Med Singap 2022;51:653-6; JAC 2022;77:2353–2363)				
	Influenza	PO Oseltamivir: PMA >40 weeks: 3mg/kg/DOSE Q12H OR (per DOSE, Q12H), **if ≥ 1yo:** ≤ 15kg: 30mg >15kg to 23kg: 45mg >23kg to 40kg: 60mg > 40kg or Adult: 75mg	NA	NA	5	**See Appendix 7 for neonatal dosing.** Consider particularly in high risk patients (age <2yr, severe, complicated, or progressive illness; or at higher risk for influenza complications). To be given as early as possible, preferably within 48 hrs of illness onset.
	RSV (see Blood 2011;117:2755 & Clin Infect Dis 2008;46:402; Clin Infect Dis 2013; 56(2): 258-66; Annals Pharmacother 2015; 49(10): 1125-35; BMT 2013; 48: 265-268; BMT 2013; 48: 1558-61; BMT 2001; 28; 759-63)	(PO Ribavirin[ID]* 20-30mg/kg/day Q8-12H OR IV Ribavirin[ID]** 25mg/kg/day Q8H d1, then 15-25mg/kg/day d2 onwards) WITH/ WITHOUT IVIG 0.5g/kg *Non-formulary (round dosing to min. quarter/half tablet as cytotoxic), **Limited [ID](ID approval required)	NA	NA	7-10 (IV/ PO)	Only in severe disease, esp. immunocompromised. Addition of IVIG appears to increase survival, and pre-emptive Rx of URTI appears to decrease risk of LRTI progression in immunocompromised. Varied dosing regimens for IV/PO ribavirin (max. 60mg/kg/day), consider dose escalation if minimal clinical response and/or concerns with GI absorption (if PO). Monitor FBC (hemolytic anemia), sCr

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Community Acquired Pneumonia (con'td)						
(Specific organisms)	*Bordetella spp. (*including B. *pertussis and B. parapertussis)* (see MMWR 2005;54(RR14):1; CDC VPD Surveillance Manual Chapter 10 (2017); CID 2015; 61(9):1421-31)	PO Clarithromycin 15mg/kg/day Q12H (>1 mth) OR PO Azithromycin (≤1 mth): 10mg/kg/day Q24H	PO Bactrim (TMP): ≥2 mth: 8mg/kg/day Q12H	NA	7 (Clarithro) 5 (Azithro) 14 (Bactrim)	Rx & prophylaxis regimes are identical. For *B. pertussis*, all household contacts should receive prophylaxis. For *B. parapertussis*, all household contact should receive prophylaxis if presence of infants <6mo, or immune-compromised person in the household. Droplet precautions for index case for both B. *pertussis and B. parapertussis* 5d after starting antibiotics; if not Rx, then isolate for 14d.
	Chlamydia trachomatis	PO Clarithromycin 15mg/kg/day Q12H	PO Azithromycin (see Bordetella dosing)	NA	10 (Clarithro) 5 (Azithro)	May have history of conjunctivitis.
	Burkholderia pseudomallei *(see Clin Microbiol Rev 2005;18:383)*	IV/ IM Ceftazidime 150mg/kg/day Q8H WITH/ WITHOUT IV Bactrim (TMP) 16-20mg/kg/day Q12H FOLLOWED BY PO Bactrim (TMP) 10mg/kg/day Q12H PLUS (PO Doxycycline 4mg/kg/day Q12H OR PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q8H))	IV Meropenem 60mg/kg/day Q8H WITH/ WITHOUT IV/ PO Bactrim (TMP) 16-20mg/kg/day Q12H FOLLOWED BY PO Bactrim (TMP) 10mg/kg/day Q12H PLUS PO Doxycycline 4mg/kg/day Q12H	NA	3-6mth IV to PO switch: only after 10-14d & patient better	Usually inhalational after soil/ mud exposure. Step-down combination with bactrim/ doxy preferred except <8yr old, where augmentin may be preferred (due to enamel staining by doxy). Higher doses of bactrim used due to higher local MIC.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Croup (Laryngotracheitis/ Laryngotracheobronchitis) see Red Book 2015. Pediatr in Rev 2001; 22(1):5-12; Cochrane Database Syst Rev 2018; 8:CD001955						
-	Commonly Parainfluenza viruses (types 1, 2, and 3); also Influenza viruses, RSV, adenoviruses, and measles	No Antibiotics required; PO Dexamethasone 0.15-0.6mg/kg/dose x 1 (max 16mg/dose)	NA	NA	1 dose (Dexa)	Single dose of oral dexamethasone reduces symptoms, shortens length of hospital stay and reduces rate of return visits to care. Symptoms usually resolve within 48H; if severe respiratory distress, may require admission for oxygen/ nebulized adrenaline.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Nosocomial/ Ventilator Associated Pneumonia see: Pediatr Crit Care Med 2011:286 & Clin Microbiol Rev 2007:409. Perform 1st dose drug monitoring for aminoglycosides routinely.						
Neonatal (never discharged from hospital)	*S. aureus,* GNB (enteric, but possibly multi-drug resistant), Pseudomonas; uncommonly Enterobacter, Serratia, Candida	IV Ceftazidime WITH/ WITHOUT IV Cloxacillin (if MSSA cover required)	IV Meropenem	Continue IV antibiotics at least 7d, stop Vancomycin, anti-fungals (if used) if no evidence of MRSA or Fungi	7 ≥21 (Candida 3-6wk) IV to PO switch: not encouraged (except fluconazole)	**See Appendix 7 for neonatal dosing.** Re-evaluate/ refer ID if not responding after 7 days. Consider anti-fungal therapy for fungal pneumonia (esp. VLBW, prior prolonged antibiotics) e.g. Fluconazole (if no prior exposure) or Micafungin/ Amphotericin. Consider vancomycin especially if colonized with MRSA.
Immune competent	As Above & occasionally anaerobic bacteria (esp. if ventilated or may have aspirated)	IV Piperacillin/ Tazo. (Pip) 300mg/kg/day Q8H	IV Meropenem 60mg/kg/day Q8H	Continue IV antibiotics at least 2d, stop Vancomycin (if used) if no evidence of MRSA	7 IV to PO switch: after 2d & patient better	Re-evaluate/ refer ID if not responding after 7 days. Consider vancomycin **(**<12yo: 15mg/kg/dose Q6H;≥12yo: 20mg/kg/dose Q8H) especially if colonized with MRSA, & anti-fungal therapy if received prior prolonged antibiotics. Evidence for dual antibiotic therapy more convincing for highly drug resistant gram negative organisms.

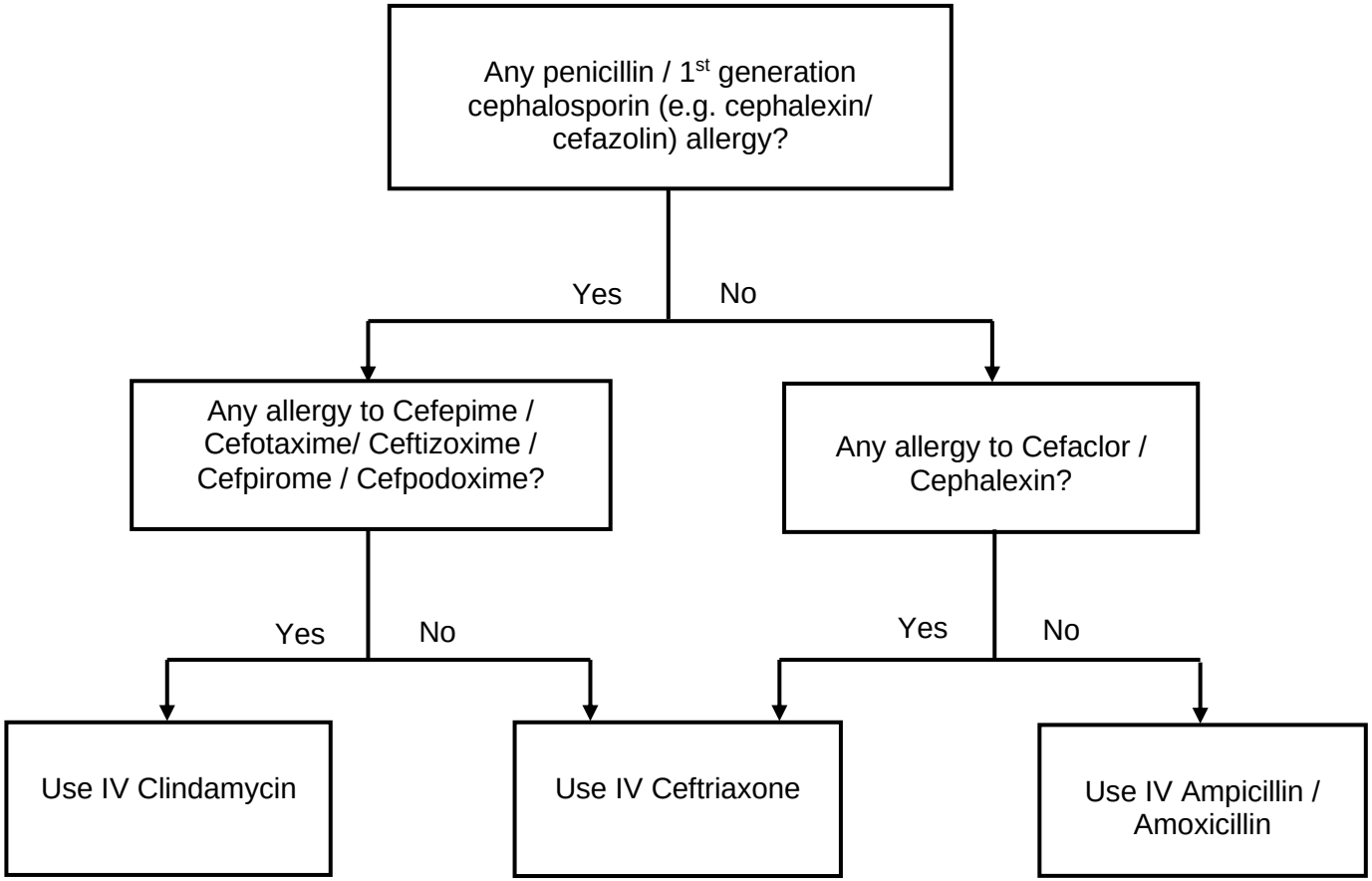
INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Nosocomial/ Ventilator Associated Pneumonia (cont'd)						
Immune compromised (including neutropenic) (see Clin Chest Med 2005;26 whole supplement, Pediatr Blood Cancer 2007;48:165)	As Above & Respiratory viruses, Aspergillus, PCP, Cryptococcus, Fusarium, Zygomycetes, Nocardia, CMV, HSV, VZV etc.	((IV/ IM Ceftazidime 150mg/kg/day Q8H OR IV Piperacillin/ Tazo. (Pip) 300mg/kg/day Q8H) PLUS IV Amikacin 15mg/kg/day) Q12H WITH/ WITHOUT IV Liposomal Amphotericin B 3-5mg/kg/day WITH/ WITHOUT IV Bactrim (TMP) 20mg/kg/day Q6H	IV Meropenem 60mg/kg/day Q8H WITH/ WITHOUT IV Liposomal Amphotericin B 3-5mg/kg/day WITH/ WITHOUT IV Bactrim (TMP) 20mg/kg/day Q6H	Continue IV antibiotics at least 7d, stop Vancomycin, Bactrim, Amphotericin (if used) if no evidence of MRSA, PCP or Fungi	≥10-14 (antibacterial) PCP: 21 (Bactrim) CMV: ≥14-21 (Ganciclovir, then step-down ≥2-3wk) Candida: ≥21-42 then secondary prophylaxis Aspergillus: ≥1-3mth then secondary prophylaxis IV to PO switch: after 7d & patient better	Early & aggressive search for pathogen with appropriate Rx must be made before patient is too ill to do so, including CT, bronchoscopy, lung biopsy. May consider atypical organisms such as Mycoplasma cover (e.g. IV Ciprofloxacin 30mg/kg/day Q8H) Consider antifungals (e.g. IV Liposomal Amphotericin B 3-5mg/kg/day; or if Aspergillus confirmed, voriconazole is drug of choice). Consider vancomycin **(**<12yo: 15mg/kg/dose Q6H; ≥12yo: 20mg/kg/dose Q8H) especially if colonized with MRSA. ID Consult strongly recommended.

APPENDIX 5: ALLERGY ALGORITHM FOR PENICILLIN ALLERGY

Please refer to KKH Clinical Pathway for Pneumonia

(Reference: Pichichero ME. Diagnostic Microbiology and Infectious Disease 2007; 57: 13S – 18S)

If patient does not require IV antibiotics and has β-lactam allergy, use Clarithromycin.



INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
SYSTEMIC FEBRILE SYNDROMES						
Fever in the Returned Traveler see NEJM 2002;347:505 & Med J Aust 2002;177:212. Suggest ID referral. Differentiate into syndromes of undifferentiated fever, heamorrhagic fever, GI, CNS, Resp illness to aid diagnosis & Mx (see relevant sections). Malaria can be rapidly fatal & must be ruled out. For dengue, use in conjunction with "KKH Pediatric Dengue Fever Pathway"						
Incubation ≤14d	Malaria, Typhoid, Dengue, N. meningitides, Influenza, Campylobacter, Shigella, Rickettsiosis, Leptospirosis etc.	IV/ IM Ceftriaxone 100mg/kg/day Q12H (if unwell) OR PO Bactrim (TMP) 10mg/kg/day Q12H (if well)	IV Ciprofloxacin 30mg/kg/day Q8H	Continue IV antibiotics at least 2-3d, then PO Bactrim	Typhoid (definite/ probable): 14 IV to PO switch: after 2d & patient better	≥3 thick/ thin blood films (over 2d) for malaria needed to rule out malaria; prefer to confirm prior to Rx. Baseline investigations should rule out 1st 7 differentials as appropriate.
Incubation >14d	Malaria, Typhoid, Hepatitis A-E, TB, Entamoeba, Brucella, Q fever, Leishmania, HIV, Rabies etc.	As Above	As Above	As Above	As Above	Avoid additional & potentially unnecessary empiric Rx (e.g. for TB) without supportive tests.
(Specific organisms)	Typhoid/ Paratyphoid ("Enteric Fever")	PO Bactrim (TMP) 10mg/kg/day Q12H OR IV/ IM Ceftriaxone 100mg/kg/day Q12-24H	PO Azithromycin 10mg/kg/day Q24H	NA	14 (Ceftriax, Bactrim) 7 (Azithro) IV to PO switch: after 2d & patient better	Use IV if unwell appearing. Rx may be longer if deep-seated infections present (e.g. meningitis, abscess). See "GI System" as well.
	Typhus (Orientia Rickettsia) (see Clin Microbiol Rev 1997;10:694)	PO Doxycycline 4mg/kg/day Q12H (not licensed in <8yr old)	PO Chloramphenicol 100mg/kg/day Q6H OR PO Azithromycin 10mg/kg/day Q24H	NA	7	Uncommon cause of prolonged fever without source. Eschar, palmar rash, transaminitis, ↓Plt, lymphopenia supportive.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
SYSTEMIC FEBRILE SYNDROMES (cont'd)						
(Specific organisms)	Malaria (Plasmodium falciparum, vivax, ovale, malariae, knowlesi) -Uncomplicated (see CDC 2013, PIDJ 2003;22:649)	(Mefloquine[ID] (base) 15mg/kg/dose x1 then 10mg/kg/dose at 8-24h) OR PO Malarone®[ID] (Atovaquone 250mg, Proguanil 100mg/ tablet) Q24H • 5 to 8 kg: half tab • 9 to 10 kg: three-quarter tab • 11 to 20 kg: 1 tab • 21 to 30 kg: 2 tab • 31 to 40 kg: 3 tab • >40kg: 4 tab OR PO Chloroquine*[ID] (base) 10mg/kg/dose x1 then 6mg/kg/dose at 6h, 24h, 48h) WITH/ WITHOUT PO Primaquine[ID] 0.3-0.6mg/kg/day Q24H	IV/ IM Quinine*[ID] (base) 16.7mg/kg/dose x1 over 4h then IV/ IM/ PO 25mg/kg/day Q8H d1-7 PLUS (PO/IV[ID] Doxycycline 4mg/kg/day Q12H OR IV/ PO Clindamycin 30mg/kg/day Q8H)	NA	3 (Chloroq, Malarone®) 3-7 (Quinine) 14 (Primaq) 7 (Doxy, Clinda)	Empiric Rx for chloroquine-sensitive falciparum malaria & other species, or severe malaria; add primaquine in vivax, ovale malaria. For chloroquine-resistant malaria (parts of Indonesia), use quinine, mefloquine, Malarone®, or PO artesunate* (*not available in KKH due to low burden).
	-Complicated/ Severe (see CDC 2020, WHO Guidelines 2015)	IV/IM Artesunate[ID] at 0h, 12h, 24h, 48h, 72h (at least 24h) 2.4mg/kg/dose THEN (PO Malarone®[ID] (preferred, see above dosing) OR PO Doxycycline 4mg/kg/day Q12H OR PO Clindamycin (if <8yo/ pregnant) 30mg/kg/day Q8H)	NA	Continue IV therapy at least 24h (or 3 doses)	1-3 (Artesunate) 3 (Malarone®) 7 (Doxy, Clinda)	Definition of severe malaria: signs of severity and/or evidence of vital organ dysfunction (see WHO 2015) Monitor for delayed hemolytic anemia with repeat hemoglobin testing at 7 and 14 days after treatment with IV artesunate.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Sepsis/ Septic Shock see Crit Care Med 2008;36:296 & NEJM 2011;365:1201, Pediatrics 2012;129:1006, Journal of Tropical Pediatrics, 2015;61:1. Empiric therapy below assumes patient is at high risk of bacteremia, with clinical evidence of tissue/ organ hypoperfusion. **Goal is early fluid, inotropic & respiratory support within 6h, source control within 6h, empiric antimicrobial therapy within 1h**, maintain normoglycaemia, ± low dose steroids; do not delay therapy for tests. Immunomodulatory therapy (IVIG) controversial but used in selected situations. See below for "Febrile Neutropenia"						
Age ≤3mth -Community acquired	GBS, *E. Coli* (& other GNB including Salmonella), uncommonly *S. pneumoniae, N. meningitis, S. aureus*, Listeria, HSV, EV	(IV Ampicillin/ Penicillin G PLUS (IV Gentamicin OR IV Cefotaxime*)) WITH/ WITHOUT IV Cloxacillin WITH/ WITHOUT IV Acyclovir	(IV Meropenem PLUS IV Amikacin) WITH/ WITHOUT IV Vancomycin	Continue IV antibiotics at least 2-7d. Stop Clox/ Vanco/ Acyclovir (if used) if no evidence of Staph/ HSV. De-escalate Mero (if used) accordingly	2-7 IV to PO switch: not encouraged if positive cultures	**See Appendix 7 for neonatal dosing.** Full septic workup must be performed; meningitis is not an uncommon cause of sepsis/ shock in this age group. Meningitic doses are implied as unable to rule out concomitant meningitis. *if age < 1 month plus suspect meningitis / septic shock; or severe jaundice in any age Septic shock, immune-competent (≥1 month): IV ceftriaxone 100mg/kg stat (max 2g/dose) can be considered if PMA **≥**41 weeks, or if <28d & no hyperbilirubinemia
-Hospital acquired See Arch Dis Child Fetal Neonatal Ed 2011;96:F9–14	Coagulase-neg *Staphylococcus* spp. (CoNS), E.coli, Klebsiella spp, uncommonly: Enterococcus, MSSA, MRSA, other GNB (e.g. *P. aeruginosa*), Candida spp	(IV Cloxacillin/ Cefotaxime* PLUS IV Amikacin) WITH/ WITHOUT IV Metronidazole	(IV Meropenem PLUS IV Amikacin) WITH/ WITHOUT IV Vancomycin	Continue IV antibiotics at least 2-7d	2-7	
Age >3mth, non-neutropenic/ immune-competent	*S. pneumoniae, N. meningitis, S. aureus*, (both MSSA & MRSA), Group A streptococci, rarely *H. influenzae* type b, *Burkholderia pseudomallei*	(IV/ IM Ceftriaxone 100mg/kg/day Q12H OR (IV/ IM Ceftazidime 150mg/kg/day Q8H PLUS IV Ampicillin 300 mg/kg/day Q6H)) PLUS IV Clindamycin 40mg/kg/day Q6H	IV Meropenem 120mg/kg/day Q8H PLUS (IV Clindamycin 40mg/kg/day Q6H OR IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H)	Continue IV antibiotics at least 7d, then PO Amox/ Clav. Stop Vanco (if used) if no evidence of MRSA. De-escalate Mero (if used) to Ceftriax	14 IV to PO switch: after 7d & patient better	Obtain history of soil contact/ outdoor sports; if present, substitute ceftriaxone for ampicillin plus ceftazidime (esp. if respiratory symptoms present). Clindamycin useful for anti-toxin activity in Gram-positive infections.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Sepsis/ Septic Shock (cont'd)						
Post-splenectomy **-non-toxic**	*S. pneumoniae, H. influenzae , N. meningitis,* Capnocytophagia	IV/ IM Ceftriaxone 100mg/kg/day Q12H	IV Meropenem 60mg/kg/day Q8H	Continue IV antibiotics at least 7d, then PO Amox/ Clav.	14 IV to PO switch: after 7d & patient better	Capnocytophagia occurs after cat/ dog bites (may initially appear innocuous).
-toxic		IV Piperacillin/ Tazo. (Pip) 300mg/kg/day Q8H				
Toxic shock syndrome	*S. aureus* (toxic shock toxin mediated)	IV Cloxacillin 200mg/kg/day Q6H PLUS IV Clindamycin 40mg/kg/day Q6H	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H PLUS IV Clindamycin 40mg/kg/day Q6H	Continue IV antibiotics at least 7d, then PO Clox & Clinda.	14 IV to PO switch: after 7d & patient better	**Source control critical.** Usually associated with cutaneous (e.g. cellulitis for both; peri/ post- varicella in Strep), genital (e.g. tampon use in Staph), or sinus/ throat portal of entry (Strep). **IVIG recommended** based on limited data & experience.
	Group A, B, C, G streptococci	IV Penicillin G 400,000 units/kg/day Q6H PLUS IV Clindamycin 40mg/kg/day Q6H	As Above	Continue IV antibiotics at least 7d, then PO Pen & Clinda.	As Above	
Neonatal Candidiasis Prophylaxis (For high-risk neonates*) see CID 2016; 62(4):e1-50; NEJM 2007; 356: 2483-95; JAMA 2014; 311(17): 1742-9; Cochrane Rev 2015; 10: CD003850, PIDJ 2009;28(8); 717-23; J Pediatr 2005; 147:172-9	Candida *spp*	IV/PO Fluconazole 3mg/kg/dose 2x/week	N/A	N/A	N/A	*NICU consensus, refer to Neonatal Drug Dosing booklet on indications & duration

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Post-splenectomy/Asplenia prophylaxis see Red Book 2015; NEJM 1986; 314(25):1593-9; Lance 2011; 378: 86-79. Refer to KKH Asplenia Guidelines						
Prophylaxis	*Streptococcus pneumoniae, Haemophilus influenzae* type b, *Neisseria meningitidis*	PO Penicillin V <3y: 125mg Q12H ≥3y: 250mg Q12H OR PO Amoxicillin 20mg/kg/day Q12H (max 500mg/dose)	PO Erythromycin 4mth-<3y: 125mg Q12H 3-4y: 250mg Q12H (NB: worsening resistance rates limits usefulness) OR PO Bactrim (TMP) 8mg/kg/day Q12H	NA	Until 5y of age or at least 1y post-splenectomy (or longer/ lifelong if needed)	Amoxicillin offers enhanced palatability and coverage of some *H. influenza*e type b strains. Appropriate duration of prophylaxis is unknown; data suggests that it may be discontinued at 5yo in patients with sickle cell disease receiving regular medical attention, who are fully immunized, and have not had a severe pneumococcal infection or surgical splenectomy. Vaccinations (pneumococcal, meningococcal, *H. influenza* type b, influenza vaccines) are recommended.
					Consider prophylaxis until 18y or lifelong for: - Highly immunocompromised individual (i.e. haematologic malignancy, hypogammaglobulinemia, HIV infection, HSCT/SOT recipients, advanced liver disease) - History of sepsis or other severe infections caused by encapsulated bacteria (i.e. *S. pneumoniae*)	

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Vascular Access Infections see Clin Infect Dis 2009; 49:1-45. Paired blood cultures, from both catheter and peripheral vein, should be obtained prior to initiation of antimicrobial therapy.						
(includes infected catheters)	Coagulase-negative *Staphylococcus* spp. (CoNS), *S. aureus* (MSSA, MRSA) Uncommonly: Gram-negative bacilli (including *P. aeruginosa*), and fungi (including *Candida* spp.)	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H	IV Linezolid$_{ID}$ <12yo: 30mg/kg/day Q8H ≥12yo: 600mg Q12H	NA	≥ 5 (organism dependent) CoNS: 5 – 7*; 10-14 (if line retained) *S. aureus*: 14* (if no evidence of endovascular infection)	Consider gram-negative cover if neutropenic; severely ill/septic shock; or with known history of colonization. Consider antifungal if on long-term TPN; prolonged broad-spectrum antibiotics; malignancy/HSCT; femoral catheterization, or Candida colonization at multiple sites. Line removal (and catheter tip for c/s) is recommended if persistently bacteremic despite 48-72H of antimicrobials, or infections due to *S. aureus*, *Enterococcus* spp., GNB (such as *P. aeruginosa*), fungi or mycobacteria. See specific Vancomycin/ Carbapenem, and antimicrobial lock therapy guidelines.

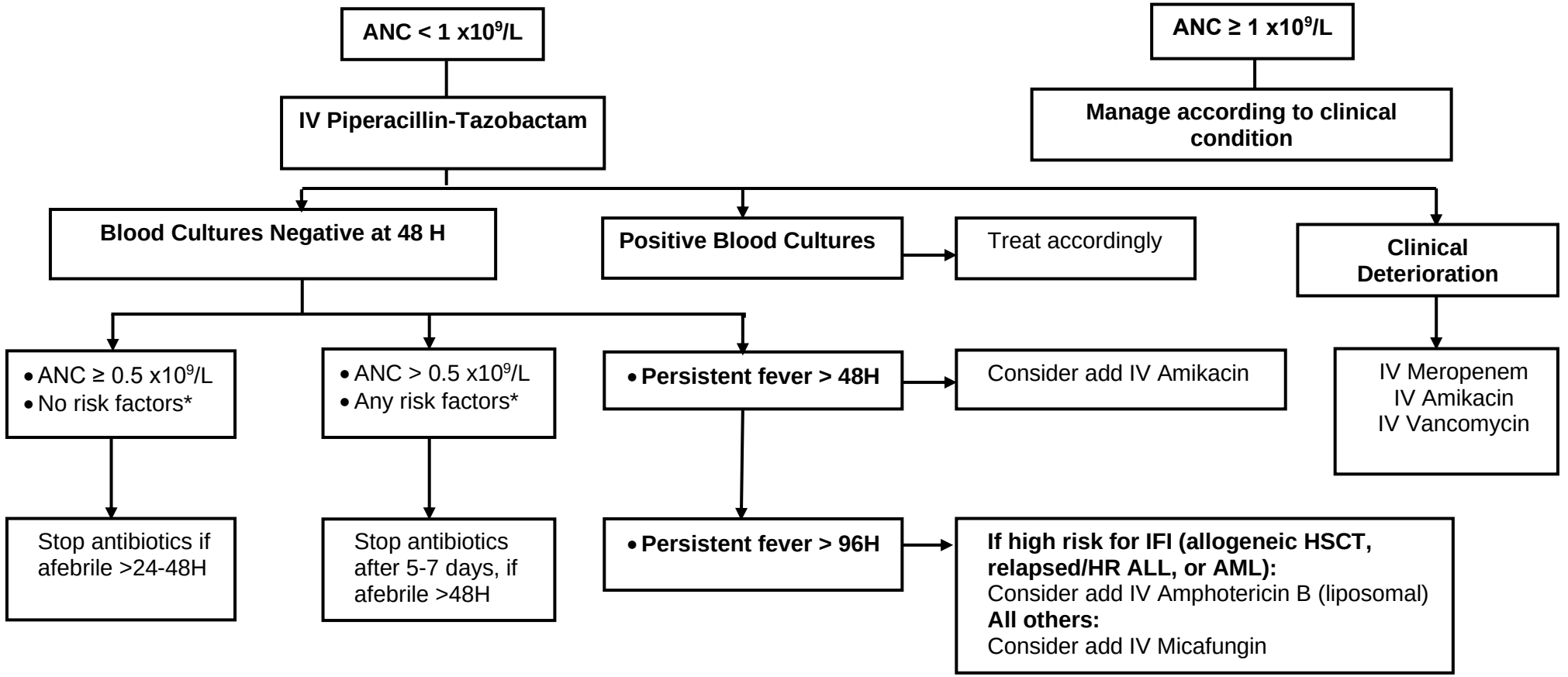
INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Febrile Neutropenia see Biol Blood Marrow Transplant 2009;15: 1143, Clin Infect Dis 2011;52:e56 & Ann Oncol 2010;21(Supp 5):v252. Febrile neutropenia is defined as single temperature ≥38.5°C or 2 consecutive readings of ≥38°C & absolute neutrophil count < 0.5x10^9/L or expected to fall below 0.5x10^9/L over next 48H (though in KKH it is currently accepted as < 1x10^9/L). Use in conjunction with most recent "KKH Febrile Neutropenia guidelines" in the Baby Bear book.						
(All patients assumed bacteraemic till proven otherwise) -toxic	CoNS, *S. aureus,* Streptococci (viridans, pneumoniae, Group A), Enterococcus, GNB (enteric, but possibly multi-drug resistant), Pseudomonas, Enterobacter, Acinetobacter, Serratia, Resp & herpesviruses, Candida, Aspergillus etc..	IV Piperacillin/ Tazo. (Pip)* 300mg/kg/day Q8H if ≤40KG or 4g Q6H if >40KG (if ANC <1x10^9/L) WITH/ WITHOUT IV Amikacin** (if not better after 48h) WITH/ WITHOUT (IV Amphotericin B (liposomal) 3mg/kg/day Q24H OR IV Micafungin (if not better after 96h anti-bacterial Rx)^) **IV Amikacin dosing**:** • 1 mth to <1yr: 7.5mg/kg/dose Q12H • 1yr to <10yr: 15mg/kg/dose Q12H • 10yr to <18yr: 10mg/kg/dose Q12H *NB: First dose TDM required* ***Alternative if DDI with high-dose methotrexate:** IV Cefepime 150mg/kg/day Q8H WITH/WITHOUT IV Metronidazole 30mg/kg/day Q6H	(IV Ciprofloxacin* 30mg/kg/day Q8H PLUS IV Clindamycin 40mg/kg/day Q6H) WITH/ WITHOUT (IV Amphotericin B (liposomal) 3mg/kg/day Q24H OR IV Micafungin (if not better after 96h anti-bacterial Rx)^) **IV Micafungin dosing:** • <4mth: 10mg/kg/day Q24H • ≥4mth: 4mg/kg/day Q24H **If severe/ meningitis:** • <4mth: 15mg/kg/day Q24H • ≥4mth: 6mg/kg/day Q24H	Continue IV antibiotics at least 2-3d. Stop all anti-bacterials if: i) ANC >0.5x10^9/L, no risk factors & afebrile >24-48h ii) after 5 to 7 days if ANC <0.5x10^9/L or risk factors present, & afebrile >48h. Stop Vanco (if used) if no evidence of MRSA, CoNS.	3-14 (7-14 if bacterial cultures positive)	Ascertain localizing source of infection if possible (e.g. GI, skin, lung, CNS) to direct investigations & targeted Rx. Previous positive bacterial & fungal infections may predict current microbiologic etiology. *Note drug-drug interaction (DDI) (piptazo/ ciprofloxacin) with high-dose methotrexate (↑ MTX levels). Switch to IV Cefepime +/- Metronidazole (if enterocolitis suspected) from 1 day prior to start of high-dose MTX, till MTX levels fall below specified levels in chemo protocol. Consult ID if severe penicillin allergy. Fungal screen should be considered ≥96h after anti-bacterial Rx started if still febrile & neutropenic. ^Consider IV Amphotericin as empiric antifungal for patients at high risk for IFI (allogeneic HSCT, relapse/HR ALL, AML); all others (if not already on Micafungin 2mg/kg/day prophylaxis): Micafungin) **NB: refer Appendix 6: Febrile Neutropenia.**

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy			
Prophylaxis	*Pneumocystis jirovecii* see J Antimicrob Chemother 2016; 71: 2397 (ECIL). AIDSInfo 2022	PO Bactrim (TMP) 5mg/kg/day Q12H, twice a week (max 80mg TMP/dose) NB: avoid if <2 mth, G6PD deficient. Discontinue 1 week before till at least 72 hours after high-dose methotrexate	**If G6PD deficient/ severe sulfonamide allergy:** IV Pentamidine 4mg/kg/dose x 1 every 2-4 weeks **PO options:** **If G6PD present and nil severe sulfonamide allergy** PO Dapsone* 2mg/kg/day (max 100mg) OD or 4mg/kg/day once weekly (max 200mg/dose) **If G6PD deficient:** PO Atovaquone* (1-3 months or >2yo: 30mg/kg/day; 4-24 months: 45mg/kg/day OD, max 1500mg/day)	NA	≥3mth (till immune reconstitution). Duration depends on individual patient's risk factors and institutional protocols	**All other alternatives inferior to Bactrim.** IV pentamidine associated with hypotension. If breakthrough PCP with Q4W, consider Q2W. Dapsone associated with abnormal LFTs, hemolytic anemia, methemo-globinemia (esp. with higher dosing) *not available in KKH. NB: Atovaquone suspension costs may be prohibitive. Gastrointestinal side effects common, require high-fat meal for better absorption **Refer to: "63710-Guide-0039" for PCP Prophylaxis** **Refer ID for PCP treatment.**
	Others (Gram-neg & Gram-pos bacteria, less commonly herpes viruses, candida)	**Antiviral** PO Acyclovir <40 kg: 80 mg/kg/day Q12H ≥40 kg: 800 mg/dose Q12H **Antifungal** Auto-HSCT: PO Fluconazole 6mg/kg/day Q24H Allo-HSCT: IV Micafungin (4mg/kg/day if ≥30 days to <4months old; 2mg/kg/day if ≥4 months old) then PO Posaconazole **Antibacterial*** PO Fluoroquinolone: 1-<6mo: PO Ciprofloxacin 15mg/kg/dose Q12H ≥6mo-<5yo: PO Levofloxacin 10mg/kg/dose Q12H ≥5yo: PO Levofloxacin: 10mg/kg/dose Q24H		**Local regimen, refer to:** **"67046-CL0705" Prophylaxis for Regimen-Related Toxicities and Infectious Complications in Paediatric Patients Undergoing Haematopoietic Stem Cell Transplant & "63710-Guide-0041" For Acyclovir Prophylaxis for specific conditions, antimicrobial prophylaxis and duration.** *For AML patients, fluoroquinolone ppx may be considered during periods of neutropenia (ANC <0.5), no alternatives if G6PD deficient/ allergy. Ensure appropriate vaccinations post-chemotherapy/ transplant.		

APPENDIX 6: FEBRILE NEUTROPENIA
***Please refer to KKH Febrile Neutropenia Guidelines in the Baby Bear Book.**

In the face of severe neutropenia, there may be no pyuria for a suspected UTI, normal CXR in pulmonary infection and no CSF pleocytosis in meningitis.

- Stop any ongoing chemotherapy
- Prophylactic antimicrobials (i.e. co-trimoxazole for PCP prophylaxis, acyclovir for HSV prophylaxis) should be continued, if present.
- Steroids should be continued (abrupt discontinuation during sepsis may trigger adrenal crisis)



INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Candida infections see Clin Microbiol Infect 2012; 18 (Suppl.7): 38-52; Clin Infect Dis 2016; 62(4): e1-50. Evaluation to detect end-organ involvement is recommended – suggest lumbar puncture for neonates/ infants TRO HCME, refer EYE TRO Candida endophthalmitis; 2DE TRO endocarditis. Send isolated *Candida spp.* for antifungals susceptibility testing.						
Invasive candidiasis/ Candidemia	*Candida spp.* (more frequently - *C. albicans, C. parapsilosis, C. tropicalis* in neonates; less frequently - *C. glabrata, C. krusei)*	**If full-term (GA≥37 weeks), ≥1 month old and without concerns of CNS involvement**: IV Anidulafungin[#] Loading dose: 3mg/kg/day (max: 200mg) on D1, Maintenance dose: 1.5mg/kg/day Q24H (max: 100mg) from D2 onwards **All others (e.g. premature neonates, concerns of CNS involvement):** IV Micafungin <4 months: 10-15 mg/kg/day Q24H (max 100mg/day) ≥4 months: 4-6mg/kg/day (max 300mg/day)	IV Amphotericin B (liposomal) 3-5 mg/kg/day Q24H OR *IV Fluconazole *(if not critically ill, no prior azole exposure and isolate susceptible)* 8-12mg/kg/day (max 1600mg/ day)	NA	**If repeat blood culture negative & symptoms resolution:** 14d from 1st negative cultures (longer if complicated/ disseminated/ unresolved/ deep infection/ abscesses or end-organ disease)	**Refer ID**. [#]Anidulafungin preferred as more cost-effective. Often healthcare-associated, risk factors include prematurity, presence of CVC, recent abdominal surgery, malignancy/ HSCT/ SOT, NEC, exposure to broad-spectrum antibiotics, and TPN. Source control is key - remove CVC and/ or other implanted prosthetic devices timely. Any premature neonate/ infant with IC should be assumed to have disseminated disease, treat as for haematogeneous Candida meningoencephalitis (HCME) first; start at upper limit of dosing range for CNS/ refractory infections. *Fluconazole: see Appendix 7 for neonatal dosing.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
SKELETAL SYSTEM see Clin Pharmacokinetics 2009;48:89 for review on antibacterial penetration into bone.						
Acute Hematogenous Osteomyelitis (AHOM) see JPIDS 2021:10, Pediatr Drugs 2004;6:333, PIDJ 2010;29:1123, NeoReviews 2011;12:e374). Cultures of bone & blood essential. Sinus tract cultures do not predict bone cultures. Abscesses may extend into surrounding soft tissues, drainage usually necessary. *Uncomplicated: single bone, rapid response (clinical, CRP within 3-5d), rapid resolution of bacteremia (1-2d after therapy, source control), nil acute or late sequelae of infection						
Age ≤1mth (see NeoReviews 2011;12:e374)	Most common: *S. aureus*, Others: GNB (enteric), GBS; >1 mth, above & Group A Streptococci, uncommonly *H. influenzae* type b, *S. pneumoniae,* Salmonella	IV Cefazolin 150mg/kg/day Q8H OR IV Cloxacillin 200mg/kg/day Q6H	IV Clindamycin 40mg/kg/day Q6H	Continue IV antibiotics at least 28d	28-42 IV to PO switch: not encouraged	**See Appendix 7 for neonatal dosing.** *Consult ID/Allergy if penicillin allergy suspected. May be associated with overlying skin redness or discharge. Dx can be difficult. Consider Ceftriaxone/ Cefotaxime (or Ciprofloxacin if severe penicillin allergy) if concerns about Salmonella (not uncommon in haemoglobinopathy, even if mild), or Hib infections (increasingly rare, but possible in un-immunized children). MRSA & resistant GNB more common in nosocomial osteomyelitis. If presumed/ MSSA, converting to PO cephalexin (75-100mg/kg/day, up to 4-6g/day) or PO Clindamycin (40mg/kg/day, up to 1.8-2.7g/day) can be considered.
Age >1mth				Continue IV antibiotics at least 2-4d	21-42 IV to PO switch: after 2-4d & patient better (shorter courses of 21-28d possible if CRP normalizes in 7-10d, uncomplicated*)	
Contiguous Osteomyelitis						
Puncture wound of foot (nail through sneakers) (see JID 1989;160:657)	*Pseudomonas aeruginosa*	IV Ceftazidime 150mg/kg/day Q8H WITH (IV Cefazolin 150mg/kg/day Q8H OR IV Cloxacillin 200mg/kg/day Q6H)	IV Ciprofloxacin 30mg/kg/day Q8H WITH/ WITHOUT IV Clindamycin 40mg/kg/day Q6H	Continue IV antibiotics (if needed) at least 2-3d	8-28 IV to PO switch: after 2d & patient better	Need debridement & removal of foreign body. Assess need for tetanus toxoid. Oral Ciprofloxacin or Levofloxacin may be considered if very well & IV therapy not required.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Post-surgical (e.g. fixation, sternotomy), or implant in bone (see NEJM 2004;350:1422, Int J Infect Dis 2010;14:e752)	Staphylococci (CoNS or aureus), Pseudomonas, uncommonly enteric GNB (esp. spinal implants)	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H WITH/ WITHOUT IV/ IM Ceftazidime 150mg/kg/day Q8H	IV Clindamycin 40mg/kg/day Q6H WITH/ WITHOUT IV Ciprofloxacin 30mg/kg/day Q8H	**No implant:** continue IV antibiotics at least 14d **With implant:** continue IV antibiotics at least 42d	No implant: 28-42 With implant: 42d-6mth IV to PO switch: after 14-28d & patient better (42d-3mth for implants)	If infection within 30d of spinal implant, may treat till bone fusion; in other scenarios, removal of implant often necessary (if present). Do not use vancomycin for MSSA. Addition of rifampicin may be beneficial during oral phase of therapy.
Chronic Osteomyelitis see J Bone Joint Surg Br 2011;93:1005						
-	*S. aureus*, TB, Actinomyces Brucella, etc. Chronic recurrent multifocal OM (CRMO) is dx of exclusion	IV Cefazolin 150mg/kg/day Q8H OR IV Cloxacillin 200mg/kg/day Q6H (Empiric Rx not favoured, unless acute-on-chronic osteomyelitis occurs)	NA	Continue IV antibiotics at least 2-4d if pyogenic material on histology	≥28-42 (often 3-6mth) IV to PO switch: after 2-4d & patient better (if Abx given)	Cultures & histology essential to guide Rx. Debridement & removal of devitalized bone crucial. Surgical techniques (e.g. distraction osteogenesis) useful.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Septic Arthritis see CID 2009;48:1201, JAC 2019; 74: 3579-87; J Pediatr Orthop 2009;29:518; Pediatr 2021; 234: 236-244:1-9; Pediatr Infect Dis J 2016;35:1288–1293; J Pediatr Orthop 2009;29:636–642; JPIDS 2019;8(3):228–34; SMJ 1989;30:356						
Age ≤3mth	*S. aureus*, GNB (enteric), GBS; >1 mth, above & Group A Streptococci, uncommonly *H. influenzae* type b, *S. pneumoniae,* Salmonella	IV Cefazolin 150mg/kg/day Q8H OR IV Cloxacillin 200mg/kg/day Q6H	IV Clindamycin 40mg/kg/day Q6H	Continue IV antibiotics at least 21d	21-42 IV to PO switch: not encouraged	**See Appendix 7 for neonatal dosing.** *Consult ID/Allergy if penicillin allergy suspected. Dx usually difficult. Early & repeated needle aspiration may be favoured over arthrotomy due to technical difficulty. Consider adding Ceftriaxone/ Cefotaxime (or Ciprofloxacin if severe penicillin allergy) if concerns about Salmonella (not uncommon in haemoglobinopathy, even if mild), or Hib infections (increasingly rare, but possible in un-immunized children). *Early dx & Rx (within 4d) reduces risk of long term sequelae. Blood & joint cultures essential. Consider Kocher criteria in differentiating septic arthritis from transient synovitis of the hip
Age >3mth*				Continue IV antibiotics at least 2-4d	≥21-28 IV to PO switch: after 2-4d & patient better (shorter courses of 10**-21 days possible if rapid response (clinical, CRP), source control, & no underlying disease predisposing to infection or delayed recovery/ immune-compromised) ***MSSA only, no bacteremia*	

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
SKIN & SOFT TISSUE SYSTEM **see Pediatr Dermatol 1994;11:125 & SMJ 1998;39:353 for local data, Pediatr Drugs 2006;8:99 & Indian J Dermatol Venereol Leprol 2010;76:476 for review**						
Bites see Clin Microbiol Rev 2011;24:231. Wash thoroughly with soap & water followed by topical antiseptic solutions. Assess need for tetanus prophylaxis in all cases, need for rabies prophylaxis only after exposure to terrestrial mammals and bats (not rats) in at-risk countries (see www.who-rabies-bulletin.org and "KKH Rabies Post-Exposure Prophylaxis Protocol")						
Dog/ cat bites	Pasteurella multocida (cats) or canis (dogs), Capnocytophaga (dogs), *S. aureus*, aerobic & anaerobic Streptococci, Bacteroides etc.	PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H OR IV Amoxicillin/ Clav. 120mg/kg/day (Amox: 100mg/kg/day) Q8H (if severe)	PO Clindamycin 30mg/kg/day Q8H PLUS (PO Doxycycline 4mg/kg/day Q12H (not licensed in <8yr old) OR PO Bactrim (TMP) 8mg/kg/day Q12H)	Continue IV antibiotics at least 2-3d (if IV used)	5-7 IV to PO switch: after 2-3d & patient better (if used)	Cat bites usually deeper than dog bites and more likely to get infected (80% vs. 5%); hence superficial dog bites may not require Rx. Caution: diabetic & splenectomized pts may develop overwhelming sepsis & death
Human bites (see CID 2003;37:1481)	Polymicrobial (aerobic & anaerobic Streptococci, Bacteroides, *S. aureus*, Eikenella etc.)	PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H OR IV Amoxicillin/ Clav. 120mg/kg/day (Amox:100mg/kg/day) Q8H (if severe)	PO Clindamycin 30mg/kg/day Q8H PLUS PO Bactrim (TMP) 8mg/kg/day Q12H)	Continue IV antibiotics at least 2-3d (if IV used)	5 IV to PO switch: after 2-3d & patient better (if used)	Consider X-rays for clenched fist injuries for fractures, foreign bodies. Human bites can transmit blood-borne viruses & may require testing
Marine animals/ creatures bite (see CID 2014; 59(2): e10-52; SMJ 2007; 48(1):e25–e28)	Polymicrobial (aerobic & anaerobic Streptococci, *S. aureus*.), *Aeromonas hydrophilia, Vibrio vulnificus*	PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H WITH (PO Ciprofloxacin 30mg/kg/day Q12H OR PO Doxycycline 4mg/kg/day Q12H (if G6PD deficient)) (Consider IV if severe)	PO Clindamycin 30mg/kg/day Q8H WITH (PO Ciprofloxacin 30mg/kg/day Q12H OR PO Doxycycline 4mg/kg/day Q12H (if G6PD deficient)) (Consider IV if severe)	Continue IV antibiotics at least 2-3d (if IV used)	5-7 IV to PO switch: after 2-3d & patient better (if used)	Prophylactic antibiotics usually not required in cases of injuries from jellyfish, sea anemone, or superficial wounds. Consider antibiotics especially if immune compromised, full thickness wound or deep puncture, presence of residual foreign body or obvious evidence of secondary infection. Surgical intervention may be needed in complicated puncture wounds.
Non-human primate bites (monkeys)	Polymicrobial (similar to human bites), simian viruses (e.g. herpes "B" virus)	As above (if needed) PLUS PO Acyclovir 20mg/kg/dose 5x/day (max 800mg/dose)	NA	NA	14 (for Acyclovir)	Bacterial infections not common & antibiotics may not be needed, but consider acyclovir even for local monkey bites

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Boils/ Cutaneous Abscesses see Pediatr 2011;128:e479 & Clin Infect Dis 2011;52:1 (for MRSA). Incision & Drainage is mainstay of therapy esp. if large & fluctuant						
Folliculitis - not a/w whirlpools	*S. aureus*	(Chlorhexidine 4% OR Octenidine body wash OD PLUS Topical Tetracycline 3% TDS) WITH/ WITHOUT (PO Cloxacillin 50mg/kg/day Q6H OR PO Cephalexin 50mg/kg/day 8H)	PO Bactrim (TMP) 8mg/kg/day Q12H) OR PO Clindamycin 30mg/kg/day Q8H	NA	5-10	Topical steroids are a predisposing factor for recurrent folliculitis. If recurrent, consider stopping steroids (if present), & review need for decolonization.
Folliculitis - whirlpool/ hot tubs/ pool	*Pseudomonas aeruginosa*	No Antibiotics required (spontaneous resolution in 7-10d without re-exposure)	NA	NA	NA	Usually pruritic, which distinguishes it from Staph. cutaneous infections.
Acute Skin Abscess (furunculosis, carbuncles) - non toxic (see Ann Emerg Med 2010;55:401)	*S. aureus* (both MSSA & MRSA)	(See Remarks) PO Cloxacillin 50mg/kg/day Q6H OR PO Cephalexin 50mg/kg/day Q8H OR IV Cloxacillin 100mg/kg/day Q6H OR IV Cefazolin 150mg/kg/day Q8H	PO Bactrim (TMP) 8mg/kg/day Q12H) OR PO Clindamycin 30mg/kg/day Q8H OR IV Clindamycin 30mg/kg/day Q8H	NA	5-14 (5 if not complicated)	**If immunocompetent, abscess small, afebrile & I&D done with appropriate packing, may not need antibiotics.** IV used if unable to tolerate orally; assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic)
- toxic	As above	(IV Cloxacillin 200mg/kg/day Q6H OR IV Cefazolin 150mg/kg/day Q8H) PLUS IV Clindamycin 40mg/kg/day Q6H	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H PLUS IV Clindamycin 40mg/kg/day Q6H	Continue IV antibiotics at least 7d	≥14 IV to PO switch: after 7d & patient better (up to 14 if MRSA bacteraemic)	Beware MRSA skin abscesses with necrotizing pneumonia. Need to consider metastatic seeding/ underlying focus if bacteraemic.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Recurrent Furunculosis (de-colonization) (see Infect Dis Clin N Am 2009;23:133)	*S. aureus* (both MSSA & MRSA)	(Chlorhexidine 4% OR octenidine body wash OD PLUS Topical Tetracycline 3% TDS) WITH/ WITHOUT Intranasal Mupirocin BD (formulary approved only for MRSA)	(If fail first-line, may repeat PLUS: PO Rifampicin 10-20mg/kg/day OM PLUS (PO Doxycycline 4mg/kg/day Q12H (not licensed in <8yr old) OR PO Bactrim (TMP) 8mg/kg/day Q12H)	NA	5-7	Assess for predisposing factors & Rx these if present, e.g. diabetes, anaemia, iron deficiency, hypogammaglobulinaemia, neutrophil defects (e.g. chronic granulomatous disease).
Neonatal scalp/ breast abscesses	Polymicrobial (*S. aureus*, Group A, B, D streptococci, GNB (enteric), occ. anaerobes)	IV Cloxacillin/ Cefazolin PLUS IV Gentamicin	(IV Clindamycin OR IV Vancomycin (1st line if MRSA suspected)) PLUS IV Cefotaxime*	Continue IV antibiotics at least 2-3d	7-14	**See Appendix 7 for neonatal dosing.** *Consult ID/Allergy if penicillin allergy suspected. Scalp abscesses may be secondary to fetal scalp electrodes. Mastitis/ breast abscess can be due to MRSA.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
BURNS see Cochrane 2013; 6:CD008738, BMJ 2010; 340:c241; J Hosp Infect 2017; 97:105-114. Burn-induced inflammatory response (i.e. fever, leukocytosis) usually indistinguishable from those of infection. Infection involves presence of bacteria in the wound and eschar at high concentrations (>10^5 bacteria/gram of tissue). Risk factors include large burn surfaces (i.e. >25% TBSA), full-thickness (third-degree) burns, extremes of age, inhalational injury, comorbidities (immunocompromised, DM, obesity), or undergoing aggressive surgical procedures.						
Burn Wound Infection - **early stage (within 1st week of onset)**	Mainly Gram-positive organisms including *S. aureus*, beta-hemolytic *Streptoccus* spp., CoNS, in the early period of burn (1st week). Gram-negative organisms, including *P. aeruginosa, A. baumannii, E. coli* etc., may colonize the wound surface in the later period.	IV Cefazolin 150mg/kg/day Q8H OR IV Cloxacillin 200mg/kg/day Q6H	(IV Clindamycin 30mg/kg/day Q8H OR IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H (1st line if MRSA suspected))	NA	Duration of antibiotics depends on presence/ severity of infection	Administer tetanus prophylaxis. May require surgical debridement/excision to ↓ bacterial burden. Universal antibiotic on initial presentation not recommended, unless presence of risk factors listed above and/or ss/x of infection. Assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic). Add Clindamycin if suspect toxic shock syndrome (see guidelines). In burns patients, the PK of antimicrobials are altered, and higher than required doses may be required. Refer ID if 48-72H later and not better.
- late stage (>1 week from onset)		(IV Cloxacillin 200mg/kg/day Q6H PLUS IV/ IM Ceftazidime 150mg/kg/day Q8H) OR IV Piperacillin/ Tazo. (Pip) 300mg/kg/day Q8H	IV Ciprofloxacin 30mg/kg/day Q8H WITH/ WITHOUT IV Clindamycin 40mg/kg/day Q6H	NA		

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Cellulitis & Erysipelas see Pediatr 2011;128:e479 & BMJ 2012;345:e4955 **Assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic**						
Neonatal Cellulitis (including omphalitis) **- non toxic**	*S. aureus*, GBS, Uncommonly: GNB (enteric) (& anaerobes in omphalitis)	PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H	PO Clindamycin PLUS PO Ciprofloxacin	Continue IV antibiotics at least 2-3d	7-14	**See Appendix 7 for neonatal dosing.** *Consult ID/Allergy if penicillin allergy suspected. Omphalitis often related to home delivery or un-hygienic cord care. For neonates: may consider a Metronidazole loading dose of 15mg/kg/dose before maintenance doses.
- toxic		IV Cloxacillin/ Cefazolin WITH/ WITHOUT IV Gentamicin WITH/ WITHOUT IV Metronidazole	(IV Clindamycin OR IV Vancomycin (1st line if MRSA suspected)) WITH/ WITHOUT IV Cefotaxime * WITH/ WITHOUT IV Metronidazole	NA		
Non-orbital Cellulitis & Erysipelas **- non toxic**	*S. aureus*, Group A streptococci (rarely *H. influenzae*)	PO Cloxacillin 50mg/kg/day Q6H OR PO Cephalexin 50mg/kg/day Q8H	PO Clindamycin 30mg/kg/day Q8H	NA	5-10	If secondary to trauma with/ without ulcer, also see "infected wound". Non-pus forming cellulitis usually due to Strep
- toxic	*S. aureus*, Group A streptococci	(IV Cefazolin 150mg/kg/day Q8H OR IV Cloxacillin 100mg/kg/day Q6H) WITH/ WITHOUT IV Clindamycin 40mg/kg/day Q6H*	IV Clindamycin 40mg/kg/day Q6H	Continue IV antibiotics at least 2-3d	5-10	May need to Rx as for necrotizing skin & soft tissue infection if unable to differentiate (see "Necrotizing Skin & Soft Tissue Infections (including Fasciitis) *Consider addition of Clindamycin if severe or concerns of toxic shock syndrome

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Cellulitis & Erysipelas (cont'd) **Assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic**						
Orbital/ peri-orbital (preseptal) Cellulitis (see Pediatr Drugs 2019; 21(6): 427-38; Clin Otolaryngol 2019; 44(3): 273-8; Eur J Opthamol 2010; 20 (6): 1066-72; Pediatrics in Review 2010;31;242; Int J Pediatr Otorhinolaryngol 2018;110:123; Int J Pediatr Otorhinolaryngol 2018;106:91; Ophthal Plast Reconstr Surg 2011;27: 330)	*S. aureus*, Group A streptococci, *S. pneumoniae, H. influenzae* (& anaerobes in orbital cellulitis)	(IV Amoxicillin/ Clav. 120mg/kg/day (Amox: 100mg/kg/day) Q8H PLUS IV Ampicillin 100mg/kg/day Q6H) OR (IV/ IM Ceftriaxone 100mg/kg/day Q12-24H PLUS IV Clindamycin 40mg/kg/day Q6H (if not better after 24-48H of initial Rx))	IV Clindamycin 40mg/kg/day Q6H PLUS IV Ciprofloxacin 30mg/kg/day Q8H	Continue IV antibiotics at least 2-3d (5-7d for orbital cellulitis) PO switch to Amoxicillin/Clav; if initial presentation severe/orbital/ sinuses involved – use higher dose (Amox component 90mg/kg/day Q12H).	Peri-orbital: 7-14 Orbital: 10-42 IV to PO switch: after 2-3d (peri-orbital); 5-7d (orbital) & patient better (unless Rx as for cerebral abscess)	Urgent Eye +/- ENT referral necessary as may require sight-saving surgical debridement. Urgent imaging may be required to delineate extent of infection; may need to be repeated in 24-48H if not better. Consider surgical intervention if no clinical improvement after 24-48H of antibiotics, esp if presence of subperiosteal abscess/ diffuse orbital abscess. Often due to contiguous spread from skin (e.g. bite) or sinuses. Severe orbital cellulitis often Rx as cerebral abscesses (see "CNS").
Ezcema Herpeticum see J Pediatr 2012;161:671, Pediatrics 2011;128:1161						
- non toxic	Herpes simplex virus	PO Acyclovir 60mg/kg/day Q8H (max 800mg/dose) WITH/WITHOUT PO Cloxacillin* 50mg/kg/day Q6H	PO Acyclovir 60mg/kg/day Q8H (max 800mg/dose) WITH/WITHOUT PO Clindamycin 30mg/kg/day Q8H	NA	7-10	Look for concurrent keratoconjunctivitis. Ensure adequate hydration. Culture and antibiotics with anti-staphylococcal activity if evidence of bacterial infection (commonly *S. aureus*). *May substitute PO/IV Cloxacillin for Cephalexin (PO) or Cefazolin (IV)
- toxic		IV Acyclovir 30mg/kg/day Q8H WITH/WITHOUT IV Cloxacillin* 100mg/kg/day Q6H	IV Acyclovir 30mg/kg/day Q8H WITH/WITHOUT IV Clindamycin 40mg/kg/day Q6H	Continue IV antibiotics at least 2-3 days	7-10 IV to PO switch: if no new lesions develop and patient better	

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Impetigo/ Ecthyma see Cochrane Database Syst Rev 2012;2:CD003261						
- non toxic	*S. aureus*, (often bullous), Group A streptococci (often non-bullous, honey-crusted)	Topical Tetracycline 3% TDS OR Topical Fusidic acid TDS OR Topical Mupirocin TDS (formulary approved only for MRSA) OR PO Cloxacillin 50mg/kg/day Q6H OR PO Cephalexin 50mg/kg/day Q8H	PO Clindamycin 30mg/kg/day Q8H	NA	7-10 (7 for topical Rx)	Oral antibiotics not superior to topical except when impetigo is generalized. Assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic)
- toxic (see SMJ 2006;47:1080)	As Above & occ. *Pseudomonas aeruginosa*	IV Cloxacillin 200mg/kg/day Q6H PLUS *IV/ IM Ceftazidime 150mg/kg/day Q8H (*if suspect Ecthyma)	IV Clindamycin 40mg/kg/day Q6H PLUS IV Ciprofloxacin 30mg/kg/day Q8H	Continue IV antibiotics at least 7d	≥14 IV to PO switch: after 7d & patient better (MRSA: see above)	Neutropenia (chronic or cyclical) found to be a concomitant risk factor in ecthyma gangrenosum due to Pseudomonas. **Add Clindamycin if suspect necrotizing fasciitis**
Blistering Distal Dactylitis see Pediatrics 1975; 56(1): 129-31						
-	Group A Streptococcus, also *S. aureus*	PO Cloxacillin 50mg/kg/day Q6H OR PO Cephalexin 50mg/kg/day Q8H	PO Clindamycin 30mg/kg/day Q8H	NA	7-10	I&D may be required if bullae are tense and tender, send fluid/pus for cultures if available. Topical treatment alone may be inadequate, oral treatment is recommended to avert development of new lesions.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Scarlet Fever see Red Book 2015; CDC 2016; BMJ 2018; 362: k3005. Characterized by a scarlatiniform rash (erythematous sandpaper-like rash on trunk and spreads outwards, sparing the palms, soles and face. Blanches on pressure; Usually occurs with group A streptococcal pharyngitis; tongue may be initially covered with yellowish-white coating with red papillae, but can disappear ("Strawberry tongue").						
-	Group A Streptococcus	PO Penicillin V 50mg/kg/day Q6-8H OR PO Amoxicillin 50mg/kg/day Q12H OR IM Benzathine Penicillin G ≤27kg: 600,000 units x1 dose >2kg: 1.2 million units x1 dose	PO Erythromycin 50mg/kg/day Q6H (NB: worsening resistance rates limits usefulness) OR PO Azithromycin 10mg/kg/day Q24H	NA	10 (Pen, Amox, Erythro) 5 (Azithro)	Routine testing of asymptomatic household contacts not required due to limited efficacy of prophylaxis and risk of antibiotic use (adverse effects and resistance).
Varicella-Zoster Virus Infection see Red Book 2015; Paediatr Infect Dis J 2002; 21(8): 739-42. **Routine treatment not recommended in healthy children, unless at increased risk of mod-severe infection, unvaccinated, chronic cutaneous or pulmonary disorder, long-term salicylates or short, intermittent, or inhaled corticosteroids use.**						
Immuno-competent	*Varicella-zoster virus* (VZV)	**Varicella (chickenpox)/ Herpes zoster (shingles):** PO Acyclovir 80mg/kg/day Q6H (max 800mg/dose)	**If severe/ hospitalized (chickenpox/ shingles):** IV Acyclovir 30mg/kg/day Q8H	NA	**Chickenpox:** 5-7 (PO/IV); **Shingles:** 7 (PO/IV)	Usually self-limiting, acyclovir results in only modest decrease in symptoms, by ↓ number of lesions and disease duration (7.6 vs 9 days) and indicated in more severe disease. Begin treatment within first 24 hours of rash onset. Increased risk of necrotizing SSTI with NSAIDSs use in VZV infections, use with caution. IV acyclovir recommended for immunocompromised. Consult ID if concerns of acyclovir-resistant VZV.
Immuno-compromised					**Chickenpox:** 7-10 (PO/IV), or until no lesions for 48H **Shingles:** 7-10 (PO), or longer if lesions resolve slowly; 10-14 (IV) IV to PO switch: if no new lesions develop and patient better	

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Infected Wounds see CID 2001;33(S2):S67 & S84. **Ensure tetanus vaccination up to date**, otherwise give tetanus toxoid. Recommendations reflect local microbiology. **Assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic**						
Post-Traumatic/ Diabetic - non toxic	Mainly *S. aureus* (both MSSA & MRSA), Group A streptococci; occ. anaerobic Streptococci, GNB (enteric), Clostridia; if water exposed, Pseudomonas & Aeromonas	(PO Cloxacillin 50mg/kg/day Q6H OR PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H) WITH/ WITHOUT PO Ciprofloxacin 30mg/kg/day Q12H	PO Bactrim (TMP) 8mg/kg/day Q12H WITH/ WITHOUT PO Ciprofloxacin 30mg/kg/day Q12H	NA	5-14	Obtain cultures & sensitivity. Select Amox-Clav if wounds may be contaminated by food/ faeco-oral material. Debridement may be required. Assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic) *May substitute PO Cloxacillin for PO Cephalexin
- toxic (including worsening to necrotizing fasciitis)	As Above & occ. *B. pseudomallei* (if soil exposed)	IV Cloxacillin* 200mg/kg/day Q6H PLUS IV/ IM Ceftazidime 150mg/kg/day Q8H PLUS (IV Clindamycin 40mg/kg/day Q6H OR IV Metronidazole 30mg/kg/day Q6H)	IV Meropenem 60mg/kg/day Q8H PLUS IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H	Continue IV antibiotics at least 7d	≥14 IV to PO switch: after 7d & patient better (MRSA: see above)	May require debridement if infection worsens to involve fascia/ muscle. Metro preferred if wound is below waist.
- chronic	As Above, including *B. pseudomallei,* atypical Mycobacteria	PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H (Empiric Rx not favoured, unless acute-on-chronic wound infection occurs)	IV Amoxicillin/ Clav. 120mg/kg/day (Amox: 100mg/kg/day) Q8H (if unable to tolerate orally)	NA	≥28-42 (often 3-6 months if melioidosis or Mycobacteria confirmed)	Cultures & histology essential to guide Rx. Debridement +/- subsequent skin grafting may be required.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Infected Wounds (cont'd) **Assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic**						
Post-Surgical (no GI/ GU tract or head & neck involvement) **- non toxic**	*S. aureus* (both MSSA & MRSA), Group A streptococci	PO Cloxacillin* 50mg/kg/day Q6H OR PO Bactrim (TMP) 8mg/kg/day Q12H	PO Clindamycin 30mg/kg/day Q8H	Continue IV antibiotics at least 2-3d (if IV used)	≥7-14 IV to PO switch: after 2d & patient better (MRSA: see above)	Drain wound collections. Intra-operative cultures more reliable than surface swabs (usually reflect colonization). Assess for deep-seated complications (e.g. osteomyelitis). May require debridement if infection worsens to involve fascia/ muscle. *May substitute PO/IV Cloxacillin for Cephalexin (PO) or Cefazolin (IV)
- toxic		IV Cloxacillin* 100mg/kg/day Q6H	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H			
Post-Surgical (GI/ GU tract or head & neck involved, excluding neurosurgical procedures) **- non toxic**	Polymicrobial (*S. aureus*, Streptococci, GNB (enteric), Bacteroides, other anaerobes)	PO Amoxicillin/Clav. (Amox) 50mg/kg/day Q12H WITH/ WITHOUT (PO Clindamycin 30mg/kg/day Q8H OR PO Metronidazole 7.5mg/kg/dose Q8H)	IV Clindamycin 40mg/kg/day Q6H PLUS IV Gentamicin 7.5mg/kg/day Q8H	Continue IV antibiotics at least 2-3d (if IV used)	7-14 IV to PO switch: after 2d & patient better (MRSA: see above)	As Above. May substitute PO Clinda for PO Metro if anaerobes are of greater concern than MRSA. IV used if unable to tolerate orally. Add Vanco if concern re: CNS involvement or risk factors for MRSA carriage present (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic)
- toxic (including worsening to necrotizing fasciitis)	As Above & occ. Pseudomonas (esp. if neutropenic)	IV Piperacillin/ Tazo. (Pip) 300mg/kg/day Q8H WITH/ WITHOUT IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H PLUS IV Meropenem* 60mg/kg/day Q8H	Continue IV antibiotics at least 7d	≥14 IV to PO switch: after 7d & patient better (MRSA: see above)	As Above, but assess for extension from/ into peritoneum, Rx longer if present +/- drainage & debridement. Add Vanco if post-op infection after Neurosurgical instrumentation esp. if risk factors for MRSA carriage present.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Infected Wounds (cont'd) **Assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic**						
Post-Surgical - neurosurgical/ CNS device/ head trauma infections	Staphylococci (CoNS or aureus), *Cutibacterium acnes*, GNB (including *Pseudomonas* spp.), rarely: *Corynebacterium* spp.	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H PLUS IV/ IM Ceftazidime 150-200mg/kg/day Q8H [Consult ID if intrathecal Rx required]	IV Vancomycin <12yo: 15mg/kg/dose Q6H ≥12yo: 20mg/kg/dose Q8H PLUS IV Meropenem 120mg/kg/day Q8H [Consult ID if intrathecal Rx required]	Continue IV antibiotics at least 7d	(Days after sterile CSF) CoNS/ *C. acnes*: 7-10 *S. aureus*: 10-14 GNB: 10-14 (up to 21d – experts' opinion) IV to PO switch: not encouraged	Refer to "Central Nervous System: CNS Device/ post-neurosurgical/ head trauma infections"
Lacerations (Prophylaxis)						
-	*S. aureus* (both MSSA & MRSA), Strep pyogenes,	Topical Tetracycline 3% TDS OR Topical Chortetracycline HCL 1% (eye ointment) TDS	Topical Fusidic acid TDS	NA	5-7	Consider oral antibiotics (i.e. PO Cloxacillin, PO Cephalexin) ONLY if risk factors present: DM, immunocompromised, large lacerations >3cm, contaminated wound/ gross infection, prosthetic joint involvement.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Lymphadenitis see Sem Pediatr Surg 2006;15:99 & J Pediatr Health Care 2004;18:3. Lymphadenopathy refers to any disease process involving lymph nodes that are abnormal in size/ consistency, while lymphadenitis refers to lymphadenopathies caused by inflammatory processes (hence should exhibit signs & symptoms of inflammation) **Assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic**						
- acute, non-toxic	Viruses (EBV, CMV etc.), Group A streptococci, *S. aureus*; axillary- BCG; cervical- H. influenzae, anaerobes (Streptococci, Bacteroides), TB, NTM; occ. Kawasaki/ Kikuchi/ Kimura's disease, rarely Bartonella, Toxoplasma, Pasteurella (bites), Yersinia, Histoplasma, *B. pseudomallei* etc.	(See remarks) PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H OR PO Cephalexin 50mg/kg/day Q8H OR PO Cloxacillin 50mg/kg/day Q6H	PO Clindamycin 30mg/kg/day Q8H	Continue IV antibiotics at least 2-3d (if IV used)	≥10-14 (till symptom resolution) IV to PO switch: after 2d & patient better	For cervical lymphadenitis, consider bacterial if unilateral, solitary, tender, >2-3cm in diameter. IV used if unable to tolerate orally. May need surgical Rx if fluctuant. Diagnostic evaluation often not required initially but failure to improve with Rx mandates further tests including aspiration or excision for cultures, histology, & consideration of autoimmune, neoplastic causes. May need to consider MRSA.
- acute, toxic		IV Amoxicillin/ Clav. 120mg/kg/day (Amox: 100mg/kg/day) Q8H WITH/ WITHOUT IV Clindamycin 40mg/kg/day Q6H	IV Clindamycin 40mg/kg/day Q6H PLUS IV Ciprofloxacin 30mg/kg/day Q8H	Continue IV antibiotics at least 2-3d	As Above	
- subacute & chronic	*S. aureus,* Actinomyces/ oral anaerobes, TB, NTM, rarely Histoplasma, *B. pseudomallei*	PO Amoxicillin/ Clav. (Amox) 50mg/kg/day Q12H OR IV Amoxicillin/ Clav. 120mg/kg/day (Amox: 100mg/kg/day) Q8H (if unable to tolerate orally) (Empiric Rx not favoured, unless acute-on-chronic wound infection occurs)	IV Clindamycin 40mg/kg/day Q6H	NA	≥28-42 (often 3-6 months if melioidosis or Mycobacteria confirmed/ presumed)	Cultures & histology (complete excision) essential to guide Rx; avoid incision/ aspiration as may result in chronic sinus formation.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Necrotizing Skin & Soft Tissue Infections (including Fasciitis) see CID 2007;44:705 & J Pediatr 2007;151:79. Represents medical emergency & require **prompt surgical debridement**; intensive care support often required. See "Infected Wounds" for development of necrotizing skin & soft tissue infections post-trauma/ surgery. **Assess for risk factors for MRSA carriage (e.g. prior MRSA colonization/ history of MRSA infection, >14 days stay in healthcare facility where MRSA is endemic**						
Community-acquired, non-traumatic	Group A streptococci, Clostridia, occ. *S. aureus*	IV Penicillin G 400,000 units/kg/day Q6H PLUS IV Clindamycin 40mg/kg/day Q6H	IV Clindamycin 40mg/kg/day Q6H WITH/ WITHOUT IV Meropenem 60mg/kg/day Q8H	Continue IV antibiotics at least 7d	≥14 IV to PO switch: after 7d & patient better	Preceding varicella infection, recent contact with pharyngitis & NSAID use are major risk factors. Prolong Rx if amputation/ multiple debridement/ grafting required.
Fournier's gangrene	Polymicrobial (Bacteroides, other anaerobes, Clostridia, *S. aureus*, Streptococci)	IV Piperacillin/ Tazo. (Pip) 300mg/kg/day Q8H	IV Meropenem 60mg/kg/day Q8H	Continue IV antibiotics at least 7d	≥14 IV to PO switch: after 7d & patient better	Involves mainly perineum & scrotal region. Crepitus often felt. More common in immunocompromised children.
Staphylococcal Scalded Skin Syndrome see Am J Clin Dermatol 2003;4:165						
-	Exfoliative toxin producing *S. aureus*	IV Cefazolin 150mg/kg/day Q8H OR IV Cloxacillin 100mg/kg/day Q6H	IV Clindamycin 40mg/kg/day Q6H	Continue IV antibiotics at least 5d	5-7	Positive Nikolsky sign. NB: can mimic toxic epidermal necrolysis syndrome (no mucosal involvement in SSSS). Fluid & electrolyte losses can be significant. Beware Gram-negative superinfections.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
MRSA Decolonization						
Age <1yo or intolerant to Chlorhexidine or failed MRSA decolonization with Chlorhexidine	Methicillin-resistant *S. aureus* (MRSA)	Topical Octenisept antiseptic solution 1 app OD PLUS Topical Mupirocin 2% nasal ointment 1 app to both nostrils TDS	NA	NA	5	Recommended for all patients who are positive for MRSA. Refer to KKH Infection Control P&P.
Age ≥1yo		Topical Chlorhexidine 4% liquid soap 1 app OD PLUS Topical Mupirocin 2% nasal ointment 1 app to both nostrils TDS	NA	NA	5	
Dermatophyte Infections						
Pityriasis Versicolor (Tinea Versicolor) (see BMJ 2015; 350:h1394; Red Book 2015; Expert Opin Pharmacother 2014; 15(12): 1707-13)	*Malassezia furfur*	If mild: (Topical Selenium Sulphide 2.5% Shampoo 1 app 2-3x/week (non-formulary) OR Topical Ketoconazole 2% Shampoo 1 app 2-3x/week) WITH/WITHOUT (Topical Clotrimazole 1% OR Ketoconazole 2% Cream BD)	If severe/ unresponsive to topical therapy: PO Fluconazole 3mg/kg/day Q24H (max 50mg) OR PO Itraconazole 3-5mg/kg/day (max 200mg)	NA	2wk (Clotri, Keto cream) 2wk (Keto shampoo or selenium) 2-4wk (Flucon) 7d (Itracon)	Moisture, heat, and presence of lipids from sebaceous glands may encourage hyphal overgrowth. Shampoos are easier to disperse, may increase compliance, apply shampoo to affected areas for 5-10 minutes before washing. May take months to repigment. Topical Selenium Sulphide or Ketoconazole shampoo may prevent recurrence.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Dermatophyte Infections (cont'd) see Am Fam Phy 2003; 67(1): 101-9; Red Book 2018						
Tinea capitis (scalp) (see Pediatr Dermatol 2001;18(5): 433-8; Br J Derrm 2014; 171: 454-63)	*Trichophyton spp. and Microsporum canis*	PO Griseofulvin (microsized) 15-20mg/kg/day Q24H (max 1000mg) WITH/WITHOUT (Topical Ketoconazole 2% Shampoo 1 app 2-3x/week OR Topical Selenium Sulphide 2.5% Shampoo 1 app 2-3x/week (non-formulary))	(PO Fluconazole 6mg/kg/day Q24H (max 300mg) OR PO Itraconazole 3-5mg/kg/day Q24H (max 200mg) OR PO Terbinafine 4-6mg/kg/day Q24H: <20 kg: 62.5mg Q24H 20-40 kg: 125mg Q24H >40kg: 250mg Q24H (non-formulary)) WITH/WITHOUT (Topical Ketoconazole 2% Shampoo 1 app 2-3x/week OR Topical Selenium Sulphide 2.5% Shampoo 1 app 2-3x/week (non-formulary))	NA	4-8wk (Griseo) ≥2wk (Topical Keto/Selenium) 2-4wk (Terbin, Flucon) 2-6wk (Itracon)	Topical therapy not effective, but may be used as adjunct to reduce transmission of spores. Perform baseline LFTs before therapy. Griseofulvin superior for *Microsporum* infections, but Terbinafine superior for *Trichophyton* infections. Take Griseofulvin with milk or fatty food to increase absorption. Topical Selenium Sulphide or Ketoconazole shampoo may prevent recurrence.
Tinea corporis (body) **Tinea cruris (groin)**	*Trichophyton spp. Microsporum spp, Epidermophyton floccosum*	Topical Clotrimazole 1% Cream OR Ketoconazole 2% Cream BD	If severe/ unresponsive to topical therapy: PO Griseofulvin (microsized) 10mg/kg/day Q24H (max 500mg) OR PO Fluconazole 3mg/kg/day Q24H (max 50mg) OR PO Itraconazole 3-5mg/kg/day Q24H (max 100mg)	NA	4-6wk (Clotrim, Keto) 2-4wk (Griseo, Flucon) 2wk (Itracon)	Clinical resolution evident within 2 weeks of topical therapy. Tines cruris usually occurs in association in tinea pedis. . Moisture. Close-fitting garments, friction, and obesity are predisposing factors. Topical Miconazole 2% powder most useful in moist intertriginous areas.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Tinea pedis (feet)	*Trichophyton spp.,* and *Epidermophyton floccosum*	Mild: Topical Clotrimazole 1% Cream OR Ketoconazole 2% Cream BD OR Topical Miconazole 2% Powder 1 app BD OR Topical Terbinafine 1% cream BD (non-formulary)	If severe/ unresponsive to topical therapy: PO Fluconazole 3mg/kg/day Q24H (max 50mg) OR PO Itraconazole 3-5mg/kg/day Q24H (max 100mg/dose) OR PO Terbinafine 4-6mg/kg/day Q24H: <20 kg: 62.5mg Q24H 20-40 kg: 125mg Q24H >40kg: 250mg Q24H (non-formulary)	NA	4wk (Clotrim Keto, Micon) 1wk (Topical Terbinafine) 2wk (PO Terbin) 4wk (Itra) 2-6wk (Flucon)	Commonly occurs in association with tinea cruris and onychomycosis (tinea unguium). Ensure proper foot hygiene (keep feet dry between toes, use of absorbent foot powder, and avoidance of occlusive footwear or socks). Topical Miconazole 2% powder most useful in moist intertriginous areas.
Tinea unguium/ Onychomycosis (nail) (see Br J Derm 2014; 171: 937-58)	*Trichophyton spp.,* and *Epidermophyton floccosum*	Mild: Topical Clotrimazole 1% Solution BD OR Topical Tebinafine 1% Solution BD (non-formulary) OR Topical Amorolfine 5% Solution 1-2 app 1x/week (non-formulary)	If severe/ unresponsive to topical therapy: PO Itraconazole 5mg/kg/day Q24H (max 200mg/dose) OR PO Fluconazole 6-10mg/kg/day once weekly (max 450mg/dose) OR PO Terbinafine 4-6mg/kg/day Q24H: <20 kg: 62.5mg Q24H 20-40 kg: 125mg Q24H >40kg: 250mg Q24H (non-formulary)	NA	**Fingernails** 12mth (Clotri, Topical Terbin) 6mth (Amorol for fingernails 6wk (PO Terbin) 2mth (Itracon) 3mth (Flucon) **Toenails**: 12mth (Clotri, Topical Terbin) 9-12mth (Amorol for toenails) 12-16wk (PO Terbin) 3mth (Itracon) 6mth (Flucon)	Topical therapy has low efficacy due to poor penetration of nail plate, and should be use only when infection confined to distal ends of the nail. Prolonged therapy is usually required. Nail plate removal, followed by use of oral therapy can help cure resistant cases. Griseofulvin no longer recommended due to low efficacy, Fluconazole less effective than Terbinafine and Itraconazole, but may be a useful alternative if intolerant and may improve compliance with weekly regimen.

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Pediculosis capitis (Head Lice Infection) see Paediatrics 2015; 135(5): e1355-65.						
Age <6mth	*Pediculus humanus capitis*	Topical Permethrin 5% Lotion 1 app ONCE	If severe/ unresponsive to topical therapy: PO Ivermectin 400mcg/kg/day Q24H on D1, and D8 (non-formulary)	NA	1 dose, repeat in 7-10 days (Permethrin, Malathion) 2 doses (Ivermec)	Wet combing is also recommended; repeat regularly to detect head lice infestation. Hair should be washed with regular shampoo, and towel dried before application. Limited data for use of Ivermectin in child <15kg. All household members and close contacts should be evaluated, and receive treatment as appropriate. May repeat therapy in 1 weeks if live lice visible, although evidence suggests that retreatment at day 9 is optimal (based on life cycle of lice). Itch may persist for 2-3 weeks after successful treatment due to allergic reaction to dead lice or nits.
Age ≥6mth		Topical Malathion 0.5% Lotion 1 app ONCE				
Scabies see Red Book 2015; Paediatr Child Health 2015; 20(7): 395-402						
Age <6mth	*Sarcoptes scabiei* subspecies *hominis*	Topical Permethrin 5% Lotion 1 app ONCE	If severe/ unresponsive to topical therapy: PO Ivermectin 200mcg/kg/day Q24H on D1, and D8 (non-formulary)	NA	1 dose, repeat in 7 days (Permethrin, Malathion) 2 doses (Ivermectin)	Limited data for use of Ivermectin in child <15kg. All household members and close contacts should be evaluated, and receive treatment as appropriate. May repeat therapy in 1 week if scabies mites visible as drug is not ovicidal. Itch may persist for 2-3 weeks after successful treatment due to allergic reaction to dead scabies mites.
Age ≥6mth		Topical Malathion 0.5% Lotion 1 app ONCE				

INFECTION	USUAL ORGANISMS	SUGGESTED THERAPY		What to do if "cultures negative & patient better"	DURATION (Days)	REMARKS
		First-line therapy	Alternative therapy (if severe allergy to first-line/ penicillin)			
Paronychia see Am Fam Phy 2017; 96(1): 44-51. Defined as inflammation of the fingers or toes in one or more of the three nail folds. Can be both acute and chronic, with chronic paronychia present for >6wks. Infections are responsible for acute cases, whereas irritants cause most chronic cases. Acute paronychia usually involves only one digit at a time, more widespread disease warrants a broader investigation for systemic issues.						
-	*S. aureus* (both MSSA & MRSA), Strep pyogenes,	Mild: Warm soak or antiseptic soak (chlorhexidine, povidone-iodine) WITH/ WITHOUT (Topical Tetracycline 3% TDS OR Topical Fusidic acid 2% TDS OR Topical Mupirocin 2% ointment TDS (for MRSA))	Moderate-severe: I&D (if abscess) WITH/ WITHOUT (PO Cloxacillin 50mg/kg/day Q6H OR PO Cephalexin 50mg/kg/day Q8H OR PO Clindamycin 30mg/kg/day Q8H)	NA	5	Risk factors include manicures, fingernail biting, trauma, ingrown nails, manipulating a hangnail. If presence of abscess, I&D 1st line (send pus for cultures). Oral antibiotics are usually not required after I&D; frequent warm soaks help maintain assist wound drainage. Consider oral antibiotics only if severe/ immune-compromised.
Acne see Pediatrics 2013; 131: S163-186. **If significant, assess** for **signs of sexual precocity, virilization, and/or growth abnormalities that may indicate an underlying systemic abnormality (endocrine, tumours, gonadal/ ovarian pathology).**						
Neonatal (birth to ≤6 wk), **Infantile** (6 wk - ≤1yr) **to mid-childhood** (1-<7yr)	*Malassezia spp.*	NA	NA	NA	NA	Usually self-limiting. Affects 20% of neonates; if numerous lesions, consider antifungal cream to reduce fungal colonization. Mid-childhood acne uncommon and should warrant an endocrine workup.
Pre-adolescent – adolescent (≥7yr)	*Cutibacterium acnes*	Mild-moderate: Topical Adapalene 1 app Q24H WITH/ WITHOUT (Topical Benzoyl Peroxide 1 app Q12-24H (non-formulary) OR Topical Clindamycin 1% solution 1 app Q12-24H)	Severe: PO Doxycycline 4mg/kg/day Q12H (max 100mg/dose) OR PO Minocycline 4mg/kg/day Q12-24H (max 100mg/dose)	NA	>4-8wk (up to 4-6mth for oral abx, refer Derm if no improvement by 12 weeks)	Oral antibiotics reduce *P. acnes* colonization of the skin and follicles, consider only if numerous inflammatory lesions or non-responsive to topicals for few months. May consider alternative oral antibiotics (erythromycin, azithromycin, Bactrim) if <8yo. Oral antibiotics take 6-8 weeks to see an effect. If no improvement by week 12, switch to alternative antibiotics or refer Dermatology. Severe inflammatory and nodulocystic acne may require oral isotretinoin.

APPENDIX 7: NEONATAL ANTIMICROBIAL DOSING

Please refer to "KKH Neonatal Intensive Care Unit: Neonatal Drug Dosing Booklet (5th Edition – 2022)"

PMA: Equivalent to Gestational age (GA) plus Postnatal age (PNA) (i.e. PMA of a neonate = GA (28 weeks) + PNA (21 days old) = 31 weeks)

Antimicrobial	PMA ≤29 weeks, ≤28d of life	PMA ≤29 weeks, >28d of life	PMA 30-36 weeks, ≤14d of life	PMA 30-36 weeks, >14d of life	PMA 37-44 weeks, ≤7d of life	PMA 37-44 weeks, >7d of life	PMA ≥45 weeks
Ampicillin (bacteremia/ non-meningitis)	50mg/kg/dose Q12H	50mg/kg/dose Q8H	50mg/kg/dose Q12H	50mg/kg/dose Q8H	50mg/kg/dose Q12H	50mg/kg/dose Q8H	25mg/kg/dose Q6H
Ampicillin (pneumonia)	200 mg/kg/DAY Q6H (For PMA<41 weeks or <1 mth of life: up to 300 mg/kg/DAY Q8H if complicated) (For PMA ≥41 weeks AND ≥1mth of life: up to 400mg/kg/ DAY Q6H if complicated)						
Ampicillin (meningitis/ GBS infection)	300 mg/kg/DAY Q8H (For PMA ≥41 weeks AND ≥1mth of life: up to 400mg/kg/ DAY Q6H)						
Penicillin G (bacteremia/ non-meningitis)	50,000 units/kg/dose Q12H	50,000 units/kg/dose Q8H	50,000 units/kg/dose Q12H	50,000 units/kg/dose Q8H	50,000 units/kg/dose Q12H	50,000 units/kg/dose Q8H	50,000 units/kg/dose Q6H
Penicillin G (meningitis)	All PMA, ≤7d of life: 125,000 units/kg/dose Q8H All PMA, >7d of life: 125,000 units/kg/dose Q6H						100,000 to 125,000 units/kg/dose Q6H
Clindamycin	5-7.5mg/kg/dose Q12H	5-7.5mg/kg/dose Q8H	5-7.5mg/kg/dose Q12H	5-7.5mg/kg/dose Q8H	5-7.5mg/kg/dose Q12H	5-7.5mg/kg/dose Q8H	10mg/kg/dose Q6H

	PMA <32 weeks, <7d of life	PMA <32 weeks, ≥7d of life	PMA ≥32 weeks, <7d of life	PMA ≥32 weeks, ≥7d of life		
Cefotaxime (bacteremia/ meningitis)	50mg/kg/dose Q12H	50mg/kg/dose Q8H	50mg/kg/dose Q8H	50mg/kg/dose Q6H		
	<2kg, ≤7 d of life	**<2kg, >7 d of life**	**≥2kg, ≤7 d of life**	**≥2kg, >7 d of life**	**PMA ≥41weeks AND ≥1mth of life**	
Cloxacillin (IV)	50mg/kg/dose Q12H	50mg/kg/dose Q8H	50mg/kg/dose Q8H	50mg/kg/dose Q6H	50mg/kg/dose Q6H	
	≤2kg, ≤7 d of life	**≤2kg, 8-28d of life**	**≤2kg, ≥29d of life**	**>2kg, ≤7 d of life**	**>2kg, >7d of life**	
Cefazolin	25mg/kg/dose Q12H	25mg/kg/dose Q8H	50mg/kg/dose Q8H	50mg/kg/dose Q12H	50mg/kg/dose Q8H	

	PMA ≤29 weeks, ≤14d of life	PMA ≤29 weeks, >14d of life	PMA 30-36 weeks, ≤14d of life	PMA 30-36 weeks, >14d of life	PMA 37-44 weeks, ≤7d of life	PMA 37-44 weeks, >7d of life	PMA ≥45 weeks
Vancomycin	15mg/kg/dose Q18H	15mg/kg/dose Q12H	15mg/kg/dose Q12H	15mg/kg/dose Q8H	15mg/kg/dose Q12H	15mg/kg/dose Q8H	15mg/kg/dose Q6H

	PMA ≤29 weeks, ≤7d of life	PMA ≤29 weeks, 8-28d of life	PMA ≤29 weeks, ≥29d of life	PMA 30-34 weeks, ≤7d of life	PMA 30-34 weeks, >7d of life	PMA 35-36 weeks, all PNA	PMA ≥37weeks, PNA< 30d of life	PMA ≥37weeks, PNA ≥ 30d of life
Gentamicin	5mg/kg/dose Q48H	4mg/kg/dose Q36H	4mg/kg/dose Q24H	4.5mg/kg/dose Q36H	4mg/kg/dose 24H	4mg/kg/dose 24H	4mg/kg/dose 24H	5-6mg/kg/dose 24H OR 2.5mg/kg/dose Q8H

	PMA ≤29 weeks, ≤7d of life	PMA ≤29 weeks, 8-28d of life	PMA ≤29 weeks, ≥29d of life	PMA 30-34 weeks, ≤7d of life	PMA 30-34 weeks, >7d of life	PMA ≥35weeks
Amikacin	18mg/kg/dose Q48H	15mg/kg/dose Q36H	15mg/kg/dose Q24H	18mg/kg/dose Q36H	15mg/kg/dose Q24H	15mg/kg/dose Q24H OR 7.5mg/kg/dose Q12H

APPENDIX 7: NEONATAL ANTIMICROBIAL DOSING *(cont'd)*

Please refer to "KKH Neonatal Intensive Care Unit: Neonatal Drug Dosing Booklet (5th Edition – 2022)"

	PMA <34 weeks	**PMA ≥34 – 40weeks**	**PMA ≥41 weeks, <1mth of life**	**PMA ≥41 weeks and ≥ 1mth of life**		
Metronidazole (IV/PO) (maintenance doses)	**Loading dose of 15mg/kg/dose followed by maintenance dose (one dosing interval after initial dose)**			**NO NEED LOADING DOSE**		
	7.5mg/kg/dose Q12H	7.5mg/kg/dose Q8H	7.5mg/kg/dose Q6H or 10mg/kg/dose Q8H	7.5mg to 10mg/kg/dose Q6-8H		
	PMA <32 weeks, <14d of life	**PMA <32 weeks, ≥14d of life**	**PMA ≥32 weeks, <14d of life**	**PMA ≥32 weeks, ≥14d to <3mth of life**	**PMA ≥32 weeks and ≥3mth of life**	
Meropenem (bacteremia/ non-meningitis)	20mg/kg/dose Q12H	20mg/kg/dose Q8H	20mg/kg/dose Q8H	30mg/kg/dose Q8H	20mg/kg/dose Q8H	
Meropenem (meningitis, severe^)	40mg/kg/dose Q12H	40mg/kg/dose Q8H				
	PMA <32 weeks, <14d of life	**PMA <32 weeks, ≥14d of life**	**PMA ≥32 weeks, ≤ 7d of life**	**PMA ≥32 weeks, >7d of life**		
Ceftazidime (sepsis/ meningitis)	50mg/kg/dose Q12H	50mg/kg/dose Q8H	50mg/kg/dose Q12H	50mg/kg/dose Q8H		
	≤2kg, ≤14 d of life	**≤2kg, >14 d of life**	**>2kg**			
Cefepime (severe/ meningitis)	50mg/kg/dose Q12H	50mg/kg/dose Q8H	50mg/kg/dose Q8H			
Piperacillin-tazobactam	100mg (PIP)/kg/dose Q8H (regardless of age and weight)					
	PMA <30 weeks	**PMA ≥30 weeks**				
Acyclovir (IV)	20mg/kg/dose Q12H	20mg/kg/dose Q8H				
	PMA <38 weeks	**PMA 38 to 40 weeks**	**PMA >40 weeks**			
Oseltamivir (PO)	1mg/kg/dose Q12H	1.5mg/kg/dose Q12H	3mg/kg/dose Q12H			
Fluconazole (IV/PO) (maintenance doses)	**PMA ≤29 weeks, ≤14d of life**	**PMA ≤29 weeks, >14d of life**	**PMA ≥30 weeks, ≤ 7d of life**	**PMA ≥30 weeks, > 7d of life**		
	Loading dose of 12-25mg/kg/dose followed by maintenance dose (one dosing interval after initial dose)					
	10-12mg/kg/dose Q48H	10-12mg/kg/dose Q24H	10-12mg/kg/dose Q48H	10-12mg/kg/dose Q24H		

For maximum doses/dosage adjustments in renal dysfunction, please contact respective satellite pharmacists
^see "KKH Carbapenem Guidelines"

APPENDIX 8: GUIDELINES FOR INTRAVENOUS-TO-ORAL (IV-TO-PO) ANTIMICROBIALS CONVERSION

RATIONALE FOR IV-TO-PO CONVERSION

- ↓ Length of hospital stay (earlier discharge)
- ↓ Cost (drug, healthcare)
- ↓ Complications/ adverse events due to IV access
- ↓ Administration/ preparation time for IV antibiotics

CRITERIA FOR IV-TO-PO CONVERSION:

1. **Signs of Clinical Improvement**
   - Fever downtrending
   - Inflammatory markers (WBC, CRP, procalcitonin) downtrending
   - Stable vital signs
2. **Ability to tolerate oral intake**
   - On oral medications/ diet/ enteral feeds
   - No nausea/ vomiting/ severe diarrhoea
   - No GI obstruction/ ileus/ GI motility disorder
3. **Not fasting for surgery where oral medication is contraindicated**

GENERALLY <u>NOT</u> RECOMMENDED FOR:

1. **Deep-seated infections**,
   - Inadequately drained deep-seated abscesses (intra-abdominal, pelvic, liver, renal abscesses etc)
   - Infective endocarditis
   - CNS infections i.e. meningitis/ encephalitis/ brain abscesses/ CNS device infections
2. **Febrile neutropenia**
3. **Severe sepsis**

ANTIMICROBIALS SUITABLE FOR IV-TO-PO CONVERSION

- *Prescribers and pharmacists are encouraged to identify patients whose IV antibiotics are suitable for PO switch.*
- ***Choice of PO antibiotics should be condition- and pathogen-appropriate.***
- *Consult pharmacists for age-, condition-, and weight-appropriate PO dosing.*

ANTIMICROBIALS	ORAL BIOAVAILABILITY
Amoxicillin	80%
Cefaclor	>90%
Cefixime[ID]	40 – 50%
Cefuroxime	52% (with food); 37% (without food)
Cephalexin	90%
Ciprofloxacin	60 – 80%
Cloxacillin	50 – 75%
Clindamycin	90%
Co-trimoxazole (Sulfamethoxazole/ Trimethoprim)	90 – 100%
Fluconazole	>90%
Levofloxacin[ID]	99%
Linezolid[ID]	100%
Metronidazole	100%

Acknowledgements

We wish to acknowledge the following colleagues for their contributions in refining the guidelines:
Overall: Adj A/ Prof Chong Chia Yin, A/ Prof Natalie Tan WH, Dr Li Jiahui, Dr Kam Kai-Qian, Dr Karen Nadua, Dr Yung Chee Fu, A/Prof Matthias Maiwald, Dr Selina Lim Wan Xuan (PharmD), Dr Ashley Lim Shiyuan (PharmD), Mr. Cedric Poh Wei Ming

Cardiovascular System: Adj A/ Prof Tan TH, Dr Jonathan Choo
Central Nervous System: Adj A/ Prof Derrick Chan WS, A/ Prof Terrence Thomas, Mr Seow WT
Dental/ Oral: Dr Chay Pui Ling, Dr Yee Ruixiang
Ear/Nose/Throat: A/ Prof Henry Tan
Gastrointestinal System: Prof Phua KB, Dr Chiou FK, Dr Christina Ong, Adj A/ Prof Low Yee, Adj A/ Prof Caroline Ong
Genito-Urinary System: Adj A/ Prof Ng Yong Hong, Adj A/ Prof Chao SM, Dr Indra Ganesan, Dr Chong Siew Le, Dr Esther Leow
Respiratory System: Adj A/ Prof Teoh OH, A/ Prof Anne Goh, Dr Tan Wei Wei (PharmD)
Systemic Febrile Syndromes: Adj A/ Prof Chan Yoke Hwee, A/ Prof Loh TF, Dr Mok Yee Hui, Adj A/ Prof Chan Mei Yoke, Dr Soh Shui Yen, Adj A/ Prof Tan Ah Moy, Dr Chua MC, Dr Khoo PC, Dr Yeo KT, Dr Quek BH
Skeletal System: A/ Prof Arjandas Mahadev
Skin & Soft Tissue System: Dr Mark Koh, Dr Ang Seng Bin, Adj A/ Prof Low Yee, Adj A/ Prof Caroline Ong, Dr Gale Lim
Including: Dr Lee KP, Dr Tracy Tan

(Authors: A/ Prof Thoon Koh Cheng, Dr Valerie Seah Xue Fen (PharmD), Dr Rina Ong Yue Ling (PharmD) for the Antimicrobial Stewardship Program)

Additional References:

The Sanford Guide to Antimicrobial Therapy
Lexicomp Online
SGH Antibiotic Guidelines
TTSH Antibiotic Guidelines