

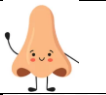
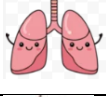
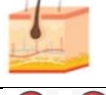
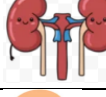
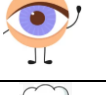
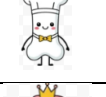
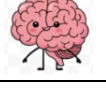


PAEDIATRIC ANTIMICROBIAL GUIDELINE

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1. Introduction

- Dosing information is available in the most recent edition of **BNF for Children**

NOTE: IN THE CASE OF SEVERE INFECTIONS, USE THE HIGHEST RECOMMENDED DOSE

- Unless otherwise stated, the duration of treatment for most of the uncomplicated infections with no serious underlying disease is 5-7 days. In serious infections, the duration will be determined by the patient's condition and response to treatment
- Empiric antimicrobial treatment for conditions not listed below should be discussed with the microbiologist
- For more detailed information regarding causative organisms and microbiological investigations, please refer to the UKPAS guidelines.
- This guidance does not cover antibiotic treatment of Haemato-oncology patients, patients with Tuberculosis or Cystic fibrosis and neonates. Please refer to separate guidelines
- All antimicrobial treatments should be revised based on clinical response or as soon as culture results are available.
- Please ensure that vital information about the patient (e.g. clinical findings, radiological/biochemical results, antibiotic history etc) is available to hand before contacting microbiologists

GOOD AMS PRACTICE POINTS

- Avoid JUST IN CASE prescribing - particularly for viral febrile illnesses which are common in children
- Review previous microbiology results e.g. is there a previous history of resistant organisms such as ESBL or MRSA that needs consideration?
 - ESBL (Extended Spectrum Beta Lactamase)-producing bacteria break down penicillins and cephalosporins, making these common antibiotics ineffective. Discuss with Consultant in Infection if unsure.
 - Consider the need for anti-MRSA antibiotic in patients who are MRSA positive.
- Antibiotics are drugs with significant side effect profile resulting in changes to microbiome, atopic signalling and development of antimicrobial resistance – please THINK before prescribing.
- Send appropriate diagnostic samples (e.g. blood cultures, urine samples, viral swab) ideally before starting antibiotic
- When prescribing antibiotics, document the indication in the notes
- Review antibiotics at 48 – 72h and consider IVOS where appropriate or discontinuing antibiotics if bacterial infection is excluded

- Limit antibiotic durations to the minimum effective duration - 5 – 7d courses are usually adequate for most uncomplicated infections unless otherwise specified.

2. Gastrointestinal Infections

Type of Infection		Antibiotic	Oral switch when clinically indicated	Duration / Comments
Appendicitis/ Peritonitis	First Line	IV Co-amoxiclav	Co-amoxiclav	Length of treatment depends on clinical condition but generally 5-7 days. In simple appendicitis (not perforated or gangrenous), IV pre-op, stop immediately post op. Antibiotics should be modified based on sensitivity results.
	Second line OR low risk penicillin allergy	IV Cefuroxime AND IV/PO Metronidazole	Cefalexin AND Metronidazole	
	High risk penicillin allergy	IV Clindamycin AND Gentamicin	Cotrimoxazole AND Metronidazole	
Infectious diarrhoea (Notifiable infections)	Salmonella (non-typhoidal)	Self-limiting unless chronic GI tract disease, haemoglobinopathy, <6 months old, malignancy or immunocompromised		If severe symptoms or immunocompromised/high risk, discuss with Consultant Microbiologist
	Shigella	Usually self-limiting		
	Campylobacter	Usually self-limiting		If systemically unwell or protracted symptoms >1 week, consider treatment with PO Clarithromycin for 5 – 7 days
	E.coli Shiga toxin producing (STEC) e.g. 0157 H7	Do not treat with antibiotics, as this may lead to an increase in toxin release.		May lead to haemolytic-uraemic syndrome (HUS).
	C.difficile infection	Severe or recurrence (after >12 weeks) <ul style="list-style-type: none"> PO Vancomycin Life-threatening <ul style="list-style-type: none"> PO Vancomycin + IV Metronidazole Relapse (<12 weeks after 1 st episode) or second line: <ul style="list-style-type: none"> Fidaxomicin PO 		Refer to the trust <i>C. difficile</i> policy PAT/IC 26 . Use BNF for children for dosage information. Duration 10 – 14 days Presence of Clostridium difficile toxin is not usually clinically significant in children under 2 years old.

3. Upper Respiratory Tract Infections

Type of Infection		Antibiotic	If MRSA positive <u>add</u> :	Oral switch	Duration /Comments
Acute Epiglottitis	First Line	IV Cefotaxime OR IV Ceftriaxone	IV Teicoplanin	Full course IV preferable	Secure airway
	High risk penicillin/cephalosporin allergy	IV Clindamycin + Ciprofloxacin	OR Oral/IV Cotrimoxazole (if sensitive)	If oral switch possible: Co-amoxiclav OR Co-trimoxazole (if Penicillin allergic) AND oral MRSA cover where indicated.	Length of treatment depends on clinical condition but minimum 5 days. Base oral switch on sensitivity results where available.
Acute Otitis Media	Viral	Viruses are common causes for which antibiotics are not indicated. Antibiotics vs placebo demonstrated 88% vs 84% no pain at 2 – 3 days if no otorrhoea. Consider paracetamol / ibuprofen + anaesthetic/analgesic ear drops (phenazone with lidocaine, e.g. Otigo)			
	If systemically unwell, or high risk of complications First Line	Oral/IV Amoxicillin <i>Recurrent infection or failure after 48hrs of Amoxicillin:</i> Oral/IV Co-amoxiclav	Oral/IV clarithromycin (if susceptible and not already on)	As for first/second line oral choice +/- MRSA cover where indicated	Antibiotics other than Azithromycin Standard duration: 5 days If severe or recurrent infection: 7 days
	Second line or Low risk penicillin allergy	Oral/ IV Clarithromycin OR Oral Azithromycin (>6 months of age)	OR Oral Linezolid (unless susceptible to clarithromycin/azithromycin and patient is on this regime)		
		<i>Recurrent infection or failure after 48hrs second line:</i> IV Cefuroxime or oral Cefaclor			
Third line or High risk penicillin or cephalosporin allergy	IV/PO Cotrimoxazole				

Sinusitis: Mild	Symptoms < 10 days	Treat with paracetamol or ibuprofen for pain			
	If symptoms not improving for >10 days: First Line	Oral/IV Amoxicillin	Oral/IV clarithromycin (if susceptible and not already on) OR Oral/IV Linezolid	As for first/second line oral choice +/- MRSA cover where indicated	For Azithromycin, treat for 3 days. Otherwise treat for 5 days
		<i>Failure after 48hrs of Amoxicillin:</i> Oral/IV Co-amoxiclav			
	Second line/penicillin allergy	Oral/IV Clarithromycin OR Oral Azithromycin (>6 months of age)			
<i>Failure after 48hrs second line:</i> IV Cefuroxime or oral Cefaclor					
Sinusitis: Severe or systemically unwell	First line	Oral/IV Co-amoxiclav			
	Second line/penicillin allergy	Oral/IV Clarithromycin			
Tonsillitis/ Pharyngitis	First Line	Oral Phenoxyethylpenicillin (Penicillin V) OR IV Benzylpenicillin (if cannot take orally)	Oral/IV clarithromycin (if susceptible and not already on)		Treat for 5 days (except for azithromycin which is 3 days)
	Second line/penicillin allergy	Oral/IV Clarithromycin OR Oral Azithromycin (>6 months of age)	OR Oral/IV Linezolid		If recurrence/relapse within 2 weeks, treat for 10 days

Peritonisillar abscess	First line	IV Benzylpenicillin PO switch: Penicillin V Failure after 48h Benzylpenicillin: IV/PO Co-amoxiclav	Oral/IV Clindamycin (if susceptible and not already on)	As for first/second line oral choice +/- MRSA cover where indicated	7 days
	Second line/penicillin allergy	IV/PO Clindamycin	OR Oral/IV Linezolid		
Pertussis	First Line	IV or Oral Clarithromycin OR Oral Azithromycin (>6 months of age)		Clarithromycin OR Azithromycin	<ul style="list-style-type: none"> ● Azithromycin: treat for 3 days. Otherwise treat for 7 days ● Commence treatment within 21 days of onset. Notifiable disease
	Second line	IV or oral Co-trimoxazole		Co-trimoxazole	

4. Lower Respiratory Tract Infections

Type of Infection		Antibiotic	If MRSA positive add:	Oral switch	Duration / Comments	
Community Acquired Pneumonia	Mild - moderate	First Line	Oral Amoxicillin	Oral Clarithromycin (if susceptible)	N/A	<ul style="list-style-type: none"> • Viruses account for a significant number of cases of Community Acquired Pneumonia in children and antibiotics may not be indicated • Length of treatment depends on clinical condition but generally 3 days for Azithromycin and 5-10 days for other antibiotics. • Discuss with microbiologist if no response after 48hrs of treatment. <p>If no better in 72hrs, consider empyema and manage as below</p>
		Second line OR Penicillin allergic	OR Oral Azithromycin (>6 months of age)	OR Add Oral Linezolid to Amoxicillin (if Clarithromycin resistant)		
		Third line (if above contra-indicated)	Oral Doxycycline (if > 8years old)			
	Severe i.e. Fever >39°C Toxicity Cough + SOB + grunting + chest pain Unilateral creps + bronchial breathing CXR → lobar consolidation	First Line	IV Coamoxiclav Add in IV/PO Clarithromycin (if suspected mycoplasma or Chlamydophila)	IV/oral Clarithromycin (if susceptible and not already on this)	PO Co-amoxiclav +/- PO Clarithromycin +/- MRSA cover where indicated	
		Low risk penicillin allergy/Second Line	IV Cefuroxime Add in IV/PO Clarithromycin (if suspected mycoplasma or Chlamydophila)	OR IV/oral Linezolid	PO Cefaclor + PO Clarithromycin +/- MRSA cover where indicated	
		High risk penicillin allergy	IV Teicoplanin AND IV Ciprofloxacin	No change (teicoplanin provides MRSA cover)	Discuss with Microbiologist.	

Type of Infection		Antibiotic	If MRSA positive add:	Oral switch	Comments
Atypical Pneumonia (e.g. Mycoplasma, Chlamydia trachomatis (<4 months old), pertussis) Features to increase suspicion: <ul style="list-style-type: none"> • Treatment failure after 3d beta lactam • Older children >5 years • Prolonged fever + respiratory symptoms (>6 days) • Low CRP (<50mg/L) • Mucocutaneous lesions CXR findings cannot distinguish between Mycoplasma pneumonia and other causes	First Line	IV/ Oral Clarithromycin OR Oral Azithromycin (>6 months of age)	IV or oral Linezolid (unless already on clarithromycin/azithromycin AND MRSA is susceptible)	PO Clarithromycin +/- MRSA cover where indicated	<ul style="list-style-type: none"> • Viruses account for a significant number of cases of Community Acquired Pneumonia in children and antibiotics may not be indicated • Length of treatment depends on clinical condition but generally 3 days for Azithromycin and 5-10 days including po switch for other antibiotics. • Discuss with microbiologist if no response after 48hrs of treatment.
	Second Line	Discuss with Microbiologist			
Pneumonia associated with or after significant viral illness such as Influenza, Measles or Chickenpox.	First Line	IV Co-amoxiclav	IV or oral Clarithromycin	Same as IV except for cefuroxime, in which case use Cefaclor.	If no better in 72hrs, consider empyema and manage as below
	Second Line OR Low risk Penicillin allergy	IV Cefuroxime	OR		

	High risk penicillin allergy	Contact Microbiologist for IV and oral option	IV or oral Linezolid		
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Empyema	First line	IV Co-amoxiclav	IV/PO Linezolid	Co-amoxiclav	Treat for 2 – 3 weeks (less if small effusion) Refer to Guidelines for Management of Parapneumonic effusions CW16.v2 Seek specialist advice from Paediatric Respiratory team and Microbiologist.
	Low risk penicillin allergy / Second line	IV Cefuroxime AND IV/PO Metronidazole		Cotrimoxazole AND metronidazole	
	High risk penicillin allergy / Third line	IV Ciprofloxacin AND IV Clindamycin	Discuss with Microbiologist	Clindamycin	

5. Skin Infections

Type of Infection		Antibiotic	Oral switch	Comments
Cellulitis - MILD	First Line	Oral Flucloxacillin	N/A	<ul style="list-style-type: none"> • Treat for 5-7 days or until resolution whichever is later • Severe or Streptococcal infection: Add Amoxicillin to Flucloxacillin if no improvement after 48hrs
	Second Line	Oral Clarithromycin		
	Penicillin allergic	OR		
	MRSA positive (if sensitive)	Oral Clindamycin (<i>if intolerant to Clarithromycin</i>)		
	If MRSA positive and resistant to above:	Oral Linezolid		
Cellulitis – MODERATE / SEVERE	First Line	IV or oral Flucloxacillin	Same as IV option	<ul style="list-style-type: none"> • Severe infection may require IV therapy
Impetigo	Second Line	IV or oral Clarithromycin		
Wound infection	Penicillin allergic	OR		
Infected eczema	MRSA positive (if sensitive)	IV or oral Clindamycin (<i>if intolerant to Clarithromycin</i>)		
	If MRSA positive and resistant to above:	IV or oral Linezolid		
Human / Animal Bites (established infection)	First Line	IV or oral Co-amoxiclav If MRSA positive add: IV/PO Linezolid	As for 1 st line	<ul style="list-style-type: none"> • Cleanse wound and consider tetanus toxoid • Assess hepatitis B & C, HIV & rabies risk. • Treat for 5 – 7 days
	For severe infections/deep bites	IV Cefotaxime AND PO Metronidazole If MRSA positive add: IV Linezolid	N/A	
	Second line/ Penicillin allergic	IV or oral Clindamycin AND IV or Oral Ciprofloxacin	Same as IV option	
	MRSA positive (if sensitive)			
	If MRSA positive and resistant to above:	IV or oral Linezolid		

6. Urinary Tract Infections (Please refer to NICE guidance regarding further investigations)

Type of Infection		First Line Antimicrobial	Penicillin allergic OR Second Line Antibiotic	Oral switch	Duration / Comments
Suspected UTI < 3 months old	Not severe sepsis	IV Cefotaxime	Discuss with Microbiologist	Based on cultures/sensitivities If culture negative, use high dose PO Cefalexin	7 – 10 days based on clinical response
	Severe sepsis	IV Cefotaxime AND Gentamicin single dose			
Lower urinary tract infection (cystitis – i.e. no systemic signs and symptoms) ≥ 3 months old		PO Nitrofurantoin OR PO Pivmecillinam if >40kg (If unable to swallow tablets use second line)	PO Cefalexin OR If recent culture with sensitive organism, use: PO Trimethoprim ♦If high risk penicillin allergy/cephalosporin allergy and 1 st and 2 nd line contra-indicated, please contact Microbiologist	Trimethoprim OR Cefalexin OR Nitrofurantoin OR Amoxicillin <i>(based on sensitivities)</i>	If ESBL , use narrowest spectrum antibiotic based on sensitivities. NB – Cephalosporins/penicillin antibiotics are ineffective Total Duration of treatment IV + Oral :
Upper urinary tract infection (pyelonephritis) ≥ 3 months old	Not severe sepsis	IV Cefuroxime	IV/PO Ciprofloxacin	Based on sensitivities but avoid Nitrofurantoin	Cystitis - 3 days
	Severe sepsis	IV Cefotaxime AND Gentamicin single dose			Pyelonephritis – 7-10 days

7. Eye Infections

Type of Infection		Antimicrobial	Oral switch	Duration / Comments
Ophthalmia Neonatorum 1.Chlamydial conjunctivitis 2.Gonococcal conjunctivitis 3.HSV conjunctivitis	First Line	Oral Erythromycin AND Single dose IV Cefotaxime dose (see BNFc) AND Chloramphenicol eye drops Add IV Aciclovir if concerns regarding HSV	N/A	<ul style="list-style-type: none"> • PO antibiotic 14d • Eye drops for 5 days • If IV aciclovir treatment required, 14 days • Seek urgent ophthalmology review • Send correct eye swabs (NAAT) for Chlamydia and gonococcus • Consider HSV if vesicles • Contact tracing mandatory for Chlamydia and gonorrhoea
	Second Line OR Penicillin allergic	Discuss with microbiologist.		
Severe bacterial conjunctivitis	Discussion with the Ophthalmologist is essential. Most cases of mild conjunctivitis are allergic or viral in origin and do not require antibiotics. Consider sterile saline or cooled boiled water.		N/A	<ul style="list-style-type: none"> • Continue antibiotics for 48 hrs after eyes are clear. • Treatment should be adjusted based on sensitivity results
	First Line	Chloramphenicol 0.5% eye drops or 1% ointment		
Second Line	Gentamicin 0.3% eye drops OR Fusidic acid 1% eye drops (only in staphylococcal conjunctivitis)			

Type of Infection		Antibiotic	MRSA positive	Oral switch	Duration / Comments	
Pre-septal cellulitis	Mild – moderate	First line	PO Co-amoxiclav	Use: Oral Linezolid	As previous	Mild-moderate pre-septal cellulitis: 5 days Severe pre-septal cellulitis: 10 days Orbital cellulitis: Continue until clinical resolution. Expected to require 2 – 4 weeks treatment. Discuss with Microbiology if no improvement after 48 - 72h
		Second line or Penicillin allergy	PO Clindamycin			
	Severe	First line	IV Co-amoxiclav	Add: IV Linezolid	Co-amoxiclav	
		Second line or penicillin allergy	PO Clindamycin AND IV Ciprofloxacin		Clindamycin AND Ciprofloxacin	
Orbital cellulitis	First Line	IV Cefotaxime AND PO Metronidazole	Add: IV Vancomycin	Co-amoxiclav	Arrange ENT and Ophthalmology review within 24 hours of admission.	
	Second line or high risk penicillin/cephalosporin allergy	IV Ciprofloxacin AND IV/PO Clindamycin		Clindamycin AND Ciprofloxacin		

8. Bone and Joint Infections

Please refer to the Adult Orthopaedic and Trauma guidelines for further information

Type of Infection	Antibacterial agent	Antibiotic	MRSA positive	Oral switch	Duration / Comments
Osteomyelitis/ Septic Arthritis (>5 yrs)	First Line	IV Flucloxacillin	Use: IV Clindamycin or Cotrimoxazole (if susceptible) OR IV Teicoplanin	Flucloxacillin	2 – 3 weeks in septic arthritis 3 – 4 weeks in osteomyelitis
	Second Line	IV Ceftriaxone		Cotrimoxazole	
	Low risk penicillin allergy				
High risk penicillin allergy	IV Cotrimoxazole				
Osteomyelitis/ Septic Arthritis (3 months-5yrs)	First Line	IV Cefuroxime	Add: IV Teicoplanin	First line (after 7 – 14 days): High dose PO Cefalexin	
	High risk penicillin / cephalosporin allergy:	IV Cotrimoxazole	If MRSA resistant to cotrimoxazole: Discuss with Microbiologist	Second line: Co-trimoxazole If MRSA positive and resistant to Cotrimoxazole: Discuss with the Microbiologist	
Osteomyelitis/ Septic Arthritis (<3months old)	First line	IV Cefotaxime	Add: IV Teicoplanin	First line (after 7 – 14 days): High dose PO Cefalexin If MRSA positive, PO Cotrimoxazole (if sensitive) or discuss with microbiology	Seek specialist advice from Orthopaedics & Microbiology

Compound fracture (A&E initial therapy)	First line	IV Co-amoxiclav	Add: IV Teicoplanin	Not applicable	Grade 1: 24 hours
	Second Line OR Low risk penicillin allergy	IV Cefuroxime AND IV Metronidazole Add single dose Gentamicin at 1 st debridement			Grade 2 – 3: 72 hours or until wound closure (whichever is sooner)
	High risk penicillin /cephalosporin allergy	IV Clindamycin Add single dose Gentamicin at 1 st debridement			Review need for continuing therapy as advised by Consultant orthopaedic surgeon.

9. Central Nervous System Infections and / or suspected sepsis of unknown origin

NOTE: AS IN CHILDRENS BNF FOR SEVERE INFECTION USE HIGHEST RECOMMENDED DOSE

Type of Infection		Antimicrobial	Duration / Comments
Neonatal Meningitis / Encephalitis < 1 month old	First line	IV Cefotaxime AND IV Amoxicillin +/- IV Aciclovir	Add IV aciclovir only if seizures, focal neurological symptoms or known exposure to HSV infection
	Low risk penicillin allergy	IV Cefotaxime AND IV Cotrimoxazole +/- IV Aciclovir	If ESBL or MRSA colonised, discuss with Microbiologist
	High risk penicillin allergy	IV Meropenem +/- IV Aciclovir	Oral switch not recommended.
Bacterial Meningitis OR Meningococcal sepsis >1 month old	First Line	IV Cefotaxime [The dose for severe infection is 50mg/kg FOUR times a day (maximum 12 grams per day)] OR IV Ceftriaxone [The dose for severe infection is 80mg/kg (maximum FOUR grams) once a day]]	Duration of treatment: ●Meningococcal 5 days ● <i>H. influenzae</i> 7-10 days ●Pneumococcal 10 days ●Group B <i>Streptococcus</i> 14 days ●Gram negative organisms at least 21 days ● <i>Listeria</i> 21 days ●Culture and PCR negative but clinically suspected bacterial meningitis: < 3 months old: 14 days ≥ 3 months old: 10 days
	High risk penicillin / cephalosporin allergy	IV Meropenem	Please notify UKHSA any suspected meningitis or meningococcal sepsis.
Viral encephalitis	IV Aciclovir	Contact virologist at Northern General Hospital (Sheffield)	< 12 years old or immunosuppressed: ● 21 days, then repeat LP >12 years old: ● 14 days, then repeat LP