ANTIMICROBIAL FORMULARY AND PRESCRIBING ADVICE FOR PAEDIATRIC PATIENTS OTHER THAN NEONATES*

VERSION 2
EFFECTIVE FROM 17 NOVEMBER 2020

THIS DOCUMENT SUPERSEDES ALL ANTIBIOTIC GUIDANCE FROM ANY SOURCE REGARDING PAEDIATRIC PATIENTS OTHER THAN NEONATES* DATED PRIOR TO THE ABOVE DATE

***FOR NEONATES PLEASE REFER TO INDIVIDUAL TRUST GUIDELINES**

Northern Lincolnshire and Goole NHS Foundation Trust

United Lincolnshire Hospitals NHS Trust

Major Changes From Last Edition

Version Control		
Version	**Date Implemented**	**Details of Key Changes**
V1.2	**April 2015**	
V2.0	**November 2020**	**Separating indications to include more detail and information on durations throughout. Brought in line with latest guidelines and NICE recommendations. Included references and additional information links** **Section 1 and 2 –** Minor changes and clarifications, including previous section 2.7 removed as no longer relevant. **Section 3** – Revision and re-format of antimicrobial agents into table form. Major change with revision of gentamicin dosing and monitoring guidance. **Section 4** – Major changes to format, revision of regimes in line with national guidance and practice, inclusion of references and other prescribing advice. **Section 5** – Added dosing to medical prophylaxis table and added a surgical prophylaxis table. **Section 6** (IV to oral step down options and costs) from V1 removed. Added information on administration of metronidazole and vancomycin formulations for patients who cannot swallow tablets/capsules whole.

1 Introduction

1.1 Aim

Antimicrobials, including antibiotics, are a very important part of the therapeutic regimen. Their indiscriminate use however, can affect many other patients through the selection of resistant organisms. Hence, it is important that antibiotic use is controlled and that profligate and unnecessary use, which selects for bacterial resistance, is avoided. The aim of this document is to encourage the appropriate use of this valuable resource.

The frequency of healthcare acquired infections, such as methicillin resistant *Staphylococcus aureus* (MRSA), *Clostridioides difficile* and gram-negative bloodstream infections is of concern with the continued widespread use of cephalosporins and fluoroquinolones, albeit the latter have been the subject of international safety concerns.

The Path Links Antibiotic Formulary and Prescribing Advice for Paediatric Patients has therefore been reviewed to ensure that the advice within is specifically targeted at:

- reducing the risk of healthcare acquired infections
- achieving better patient outcomes
- savings for the health economy
- compliance with the recommendations of the NICE antimicrobials prescribing guidelines.

Specific advice on how to deal with difficult to treat organisms or infections is beyond the scope of this document. Management of these organisms should be guided by reported sensitivities and Microbiologist advice. National documents and references, including the British National Formulary, the British National Formulary for Children and NICE Antimicrobial Prescribing guidelines should also be consulted.

1.2 Personnel

This document is aimed at all persons having prescribing rights for antibiotics.

1.3 Areas Covered

This guidance applies to all areas caring for the paediatric population excluding neonates served by the Northern Lincolnshire & Goole NHS Foundation Trust (NLAG) and United Lincolnshire Hospitals NHS Trust (ULHT). **For neonatal guidelines please refer to individual Trust guidelines.**

1.4 Antimicrobials

Antibiotics are compounds produced by micro-organisms to inhibit the growth of other micro-organisms while antimicrobials are chemically produced and modified compounds. The term “Antimicrobial” also encompasses antivirals and antifungals, in addition to antibiotics and generally, this document refers to the use of antibiotics.

1.5 Samples

Appropriate antibiotic use is best achieved when the target organism is known. Obtaining appropriate samples **prior to the antibiotic being administered is mandatory** *unless* immediate empirical treatment is indicated**.** The procedures for collecting appropriate microbiological samples can be found in the Path Links Laboratory Handbook available on the intranet.

Obtaining and acting promptly on culture and sensitivity test results is vital to ensure that only the most appropriate antibiotics are given. Any review and focus of antibiotic use arising from this must be clearly documented in the medical notes.

1.6 Contact Information

Advice regarding the appropriate use of antibiotics can be obtained from the Duty Consultant Microbiologist, or Antimicrobial Pharmacists, contactable through switchboard for the relevant Trust.

2 Prescribing of Antimicrobials

This advice is intended to:

- Ensure all antimicrobial agents are **clinically indicated and essential**.
- Ensure any **allergy information and adverse drug reactions** relating to antimicrobials is clearly recorded on the front of all the prescription charts, including the nature of the reaction.
- Ensure that prescriptions for antimicrobials are prescribed and administered at regular intervals.
- Ensure that the **correct route** is prescribed.
- Ensure that all antimicrobial prescriptions have a **specific indication documented** on the prescription chart AND in the medical records at the point of prescribing.
- Ensure all antimicrobial prescriptions have a **"review"** or **"stop" date** / length of course endorsed on the prescription chart at the point of prescribing. The duration should also be clear in the medical record.
- **Ensure all antimicrobials are reviewed at 48 to 72 hours** to focus therapy and either:
  - **Stop**
  - **De-escalate** from IV to oral therapy
  - **Change** to a narrow spectrum antibiotic
  - **Continue and review again** at 72 hours
- Apply to all paediatric patients, excluding neonates.
- Be used by medical, nursing and pharmacy staff.

2.1 General Points

Antimicrobials are only indicated when there is evidence of infection or when infection is to be actively avoided such as during surgery. The mere presence of an organism is not an indication for antimicrobials, thus an organism, even MRSA, isolated from a wound that is healing well with no signs of infection does not necessarily require antimicrobial treatment. Antimicrobials are not indicated for conditions that are generally of viral origin.

All doses given in these guidelines, unless specifically indicated otherwise, assume broadly normal renal and hepatic function. Doses may need to be adjusted if renal and hepatic function is impaired.

If a course of antimicrobials has not led to a cure, it should not be automatically repeated. Instead, the diagnosis needs to be reviewed and specialist advice sought where necessary.

2.2 Allergy Information

Any allergies adverse drug reactions to antimicrobials (and any other medicines/substances) need to be clearly documented in the medical notes AND on the prescription chart.

*****See also **Section 3.5**.

2.3 Indication

The indication for all antibiotics on the drug chart must be stated in the indication box on each individual prescription.

2.4 Timely Administration

The sooner patients with severe sepsis receive appropriate antibiotics the lower the mortality risk. All patients should receive appropriate antibiotics within 1 hour of severe sepsis onset. (Obtain blood cultures BEFORE administration of antibiotics where possible).

- The initial dose should be prescribed on the “once only” section of the prescription chart.
- The exact time of prescribing and administration should be clearly documented.
- The prescriber should inform the patient’s nurse of the need for urgent antibiotics to be administered as soon as possible.
- Nurses should contact pharmacy as soon as possible if the required antibiotic is not stocked on the Trust’s ward informing them of how urgent need for the antimicrobial is.

For more information see intranet.

It is good practice that the initial dose of all antimicrobial is prescribed on the “once only” section of the prescription chart, Care should be taken when prescribing the subsequent regular doses at the defined frequency to ensure this is taken in to account and to avoid toxicity.
Antimicrobials must be prescribed at a defined frequency, e.g. every 8 hours, to ensure antimicrobials are administered at regular intervals.

Thus dosing at 0600, 1400 and 2200 is acceptable but 0800, 1300, 1700 is NOT acceptable.
Whilst there is an understandable tendency to adjust dosing times to fit with nursing medication rounds where possible, this should not be permitted to interfere with the above.

2.5 Course Duration and “Stop”/“Review” Date

All prescribers **must** document the intended duration on the prescription chart for **all** orders of antimicrobial agents. A “stop” / “review” date must be clearly indicated on the prescription chart at the point of prescribing any antimicrobial agent. This information should be entered in the specific box for this purpose on each individual antimicrobial prescription.

2.5.1 Oral Antimicrobial Therapy

The average length of an oral course should be assumed to be 5 days unless otherwise stated in the guidelines.

For some patients it may be difficult to endorse a definite stop date until the patient’s condition begins to improve. Antimicrobial agents in these cases should have a review date approximately twice a week (e.g. consultant ward rounds and/or Fridays). As a minimum, oral prescriptions should be reviewed after 5 days and any reason for continuation must be documented in medical notes.

2.5.2 IV Antimicrobial Therapy

In patients with a severe infection who initially require IV antimicrobial therapy, they can be switched to oral therapy **within 48 hours** in the majority of cases with a number of advantages:

- Reduction in the likelihood of hospital acquired IV access associated infection.
- Reduction in patient discomfort, improved mobility and possibly increased potential for earlier hospital discharge.
- Save both medical and nursing time.
- Potentially reduce treatment costs.
- Potentially reduce the risk of adverse incidences; errors in preparation are significantly higher with parenteral drugs, compared with oral formulations.

The majority of IV antimicrobial agents will therefore require a "review" rather than a "stop" date prior to being converted to oral.

For any intravenous antimicrobials which are continued beyond 48 to 72 hours duration, the reason for continuation must be documented in the medical notes.

Intravenous antimicrobials which are re-prescribed beyond 72 hours should be reviewed daily. The decision on continuation/completion of antimicrobial therapy must be documented in the medical notes.

2.5.3 Review of Antimicrobial Therapy

There is the need to embed a "Start Smart – Then Focus" prescribing culture with daily review and documented evidence of an active review of all antibiotics after 48 hours. A day 3 prescribing decision should be documented within the notes, focusing therapy in line with cultures / sensitivities / additional clinical information on the patient at 48 to 72 hours to either:

- **Stop**
- **De-escalate** from IV to oral therapy
- **Change** to a narrow spectrum antibiotic, or escalate to a broader spectrum antimicrobial prescription if the initial was ineffective, or change based on culture and sensitivity results
- **Continue and review again** at 72 hours

2.5.3.1 IV To Oral Switch Criteria

Suitability for the early switch from IV to oral therapy should be assessed by the attending clinician on a case-by-case basis but patients should generally have all of the "**COMS**" criteria.

"**COMS**" criteria to consider:

- **C**linical improvement observed, patient haemodynamically stable.

- **O**ral route is not compromised and suitable oral antimicrobial option is available.
  N.B. If NG / PEG feeding then please consult your ward pharmacist.

- **M**arkers indicate a trend towards normal

- **S**pecific indication / deep-seated infection not present (see **exceptions***)

***Exceptions:**

- Deep-seated infections (may require an initial 2 weeks of IV therapy but seek microbiology advice)

  - Osteomyelitis, septic arthritis (N.B. high-dose oral clindamycin may be appropriate once patient is stable – seek microbiology advice).

- High risk infections requiring prolonged IV therapy (seek microbiology advice regarding the length of treatment):

  - Endocarditis
  - Exacerbations of cystic fibrosis/bronchiectasis
  - Infected implants/prosthetics
  - Intracranial abscesses
  - Legionella pneumonia
  - Mediastinitis
  - Meningitis/encephalitis
  - Severe infections during chemotherapy-related neutropenia
  - Severe or necrotising soft tissue infections
  - *Staphylococcus aureus* or *Pseudomonas spp*. bacteraemia

- Certain multi-resistant organisms may require treatment with agents that are only available in an IV form (seek microbiology advice regarding length of treatment).

For a specific indication / deep-seated infection, it is still appropriate to prescribe a review date to ensure clinical response. Antimicrobial agents in these cases should have a review date at least once a week (e.g. consultant ward rounds and/or Fridays). It is recommended that longer term IV prescriptions should be reviewed after 5 days. They should be prescribed on the long-term antimicrobial prescription section of the Inpatient Prescribing and Administration Record.

2.5.3.2 Recording the Route of Administration

When a course of antimicrobials is initiated, or switched from IV to oral, the route of administration must not only be entered onto the prescription chart, but must also be recorded in the medical notes. Prescriptions should NOT be written with dual route stated (IV/PO). Please note that the ULHT prescription chart has separate areas for IV and oral antimicrobial prescription, whereas NLaG does not.

2.6 Actions for Healthcare Professionals

2.6.1 Actions For Doctors

- Prior to prescribing any antibiotic **confirm the allergy status** of a patient, including the nature of the reaction. Ensure that the allergy/adverse drug reaction box on the front of the prescription chart is completed.

- All prescriptions for antimicrobials should include an indication in the specific box on the prescription for that purpose.

- **Write a "stop" date / intended course duration or a "review" date on the prescription chart for each antimicrobial agent prescribed.**

- The majority of IV antimicrobial therapy will require a "review" date rather than a "stop" date prior to being converted to oral. (See exceptions above*).

- Review points should be targeted for lunchtime doses where possible and should avoid weekends unless the patient is due for daily consultant review.

- Antimicrobial review should be clearly documented in the medical notes **and** on the chart by completing and signing the review box where available. Endorse a new review date if to continue.

    - For some infections, it may be difficult to endorse a definite review / stop date until the patient's clinical condition begins to improve. Antimicrobials in these circumstances should have review dates approximately twice a week (e.g. Consultant ward rounds and/or Fridays).

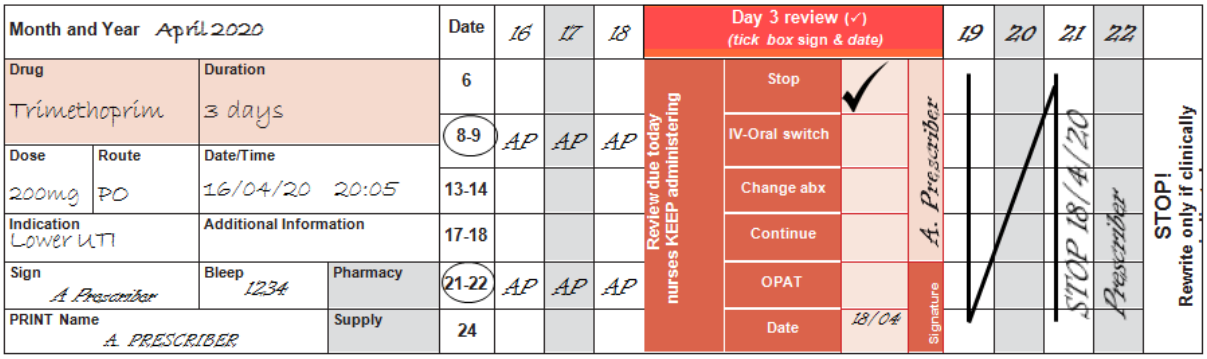
- Following an IV to oral switch a stop / course duration must be endorsed for each as either of the following:

    - "… days more" i.e. …days of oral following IV therapy
    - "… days in total" i.e. the total required duration of IV and PO together
    - or put a stop date (e.g. "stop 09/08/2020")

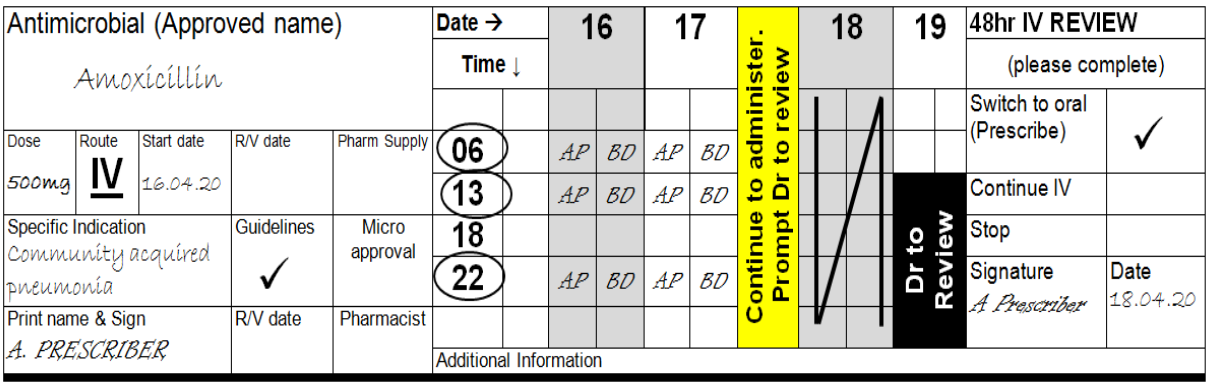
- Antimicrobial agents should be stopped / reviewed earlier than the date shown if clinically indicated.

NOTE:
When rewriting treatment sheets containing prescriptions for antibiotics, ensure that the ORIGINAL START DATE of any antibiotic, prescription which needs to be continued, is transferred onto the new prescription for that antibiotic, rather than the date the treatment sheet, is rewritten.

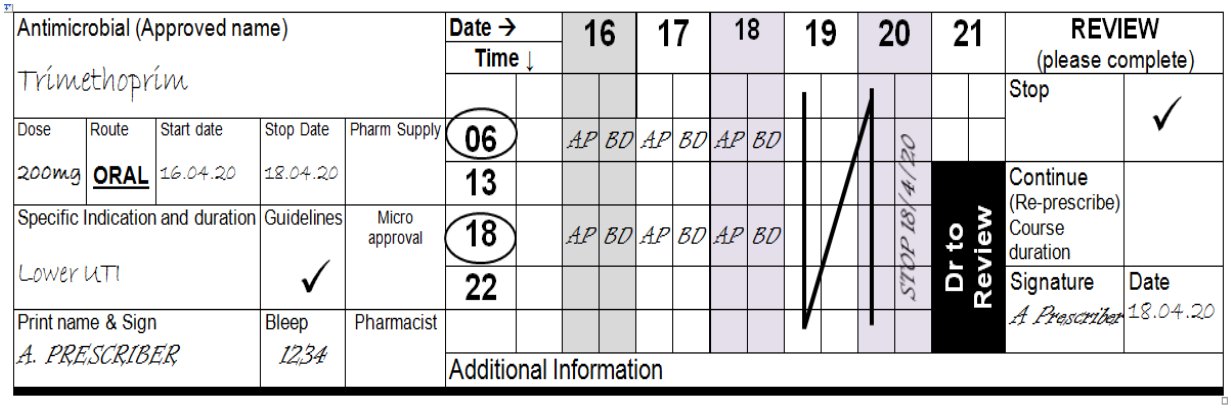
Example of a completed NLaG Antimicrobial Prescription, with stop date (mostly appropriate for oral therapy):



Example of a completed ULHT Prescription for IV Antimicrobials, with clear review decision



Example of a completed ULHT Prescription for oral Antimicrobials, with clear stop/review decision



Principles of good antimicrobial stewardship (IV to oral switch, 48 to 72 hour review, specifying indication and course duration) will be built into Trust e-prescribing and medicines management systems.

2.6.2 Actions For Nurses

- Prior to administering any antibiotic **confirm the allergy status** of a patient, including the nature of the reaction. Ensure that the allergy / adverse drug reaction box on the front of the prescription chart is completed by a prescriber or appropriate member of Pharmacy staff.

- Request the Dr to write a “review” / “stop” date on the prescription chart for all antimicrobial agents where appropriate (see exceptions above*).

- Query all prescriptions continuing beyond the “review” / “stop” dates without a review being apparent.

- Whilst awaiting review **continue to administer the antimicrobial,** but encourage the appropriate prescriber to perform in a review as soon as possible.
- Where administering antibiotics as IV infusions, be mindful that the full dose is not administered if the infusion set is not flushed through. Please refer to local medicines management and IV administration policy.

- Ask the Dr to review the prescription if a number of doses have been missed during the prescribed course, especially if the patient is still unwell or at a weekend where regular review is unlikely.

2.6.3 Actions For Pharmacists and/or Pharmacy Technicians

- Prior to checking and/or supplying any antibiotic **confirm the allergy status** of a patient, including the nature of the reaction. Ensure that the allergy/ **adverse drug reaction** box on the front of the prescription chart is completed.

- Ensure that all prescriptions for restricted antibiotics adhere to the contents of the Antibiotic Formulary and Prescribing Advice.

- Request an indication and “review” / ”stop” date to be written on the prescription chart for all antimicrobial agents.

- Inform the prescriber that the standard is to include a specific indication and “review” / “stop” date every time an order for an antimicrobial agent is made (see exceptions above*). This request should be made within 48-72 hours of the prescription being written.

- Provide support for nursing team with information on route and method of antimicrobial administration.

- Support the medical and nursing teams with information and advice on drugs requiring therapeutic dose monitoring.

- If the prescription is written in the presence of a Pharmacist, request an indication and “review” / “stop” date as part of the prescription writing process.

- Query all prescriptions continuing beyond the “review” / “stop” dates without a review being apparent. Encourage an appropriate prescriber to perform a review as soon as possible.

- Ask the doctor to review a prescription if a number of doses have been missed during the prescribed course, especially if the patient is still unwell or at a weekend where regular review is unlikely.

If the above is not possible, write in the notes requesting for a “review” / “stop” date for the antimicrobial agent or annotate the prescription chart “review route”. Review of dosage points should be targeted for lunchtime doses where possible and should avoid weekends unless the patient is due for daily consultant review.

3 Notes on Specific Compounds

List of Antimicrobials

Freely available agents do not require Consultant Microbiologist approval.

All other agents will require the name of the Microbiologist (or Antimicrobial Pharmacist) consulted to be endorsed on the prescription unless prescribed for a permitted indication as per table below.

Agent (and route)	Permitted Indications
Aciclovir (IV/PO)	Freely available
Amikacin (IV)	**Microbiologist approval required in all cases**
Amoxicillin (IV/PO) DO NOT use in penicillin allergic patients	Freely available
Ampicillin (IV) DO NOT use in penicillin allergic patients	**Not on formulary and NOT stocked**
Anti-mycobacterial Agents	TB
Azithromycin (PO)	Pertussis (treatment and prophylaxis) Prophylaxis in cystic fibrosis Campylobacter Salmonella (non-typhoid species) Typhoid Shigella dysentery Sexual Health or LRTI prophylaxis from tertiary centre
Aztreonam (IV) CAUTION in penicillin allergic patients	**Microbiologist approval required in all cases**
Benzylpenicillin (IV) DO NOT use in penicillin allergic patients	Freely available
Cefaclor (PO) CAUTION in penicillin allergic patients	**Not on formulary and NOT stocked**
Cefadroxil (PO) CAUTION in penicillin allergic patients	**Not on formulary and NOT stocked**
Cefalexin (PO) CAUTION in penicillin allergic patients	Lower UTI in children over 3 months old
Cefazolin (IV) CAUTION in penicillin allergic patients	**Not on formulary and NOT stocked**
Cefixime (PO) CAUTION in penicillin allergic patients	Sexual Health
Cefotaxime (IV) CAUTION in penicillin allergic patients	Lower UTI in children under 3 months old Acute Pyelonephritis, Complicated (upper) Urinary Tract Infection in children under 3 months old Meningitis treatment (suspected or confirmed bacterial meningitis) in children under 3 months old Salmonella (non-typhoid species)

Agent (and route)	Permitted Indications
	Typhoid Sepsis of unknown origin in children under 3 months old Orbital cellulitis Peri-orbital cellulitis Septic Arthritis
Cefpodoxime (PO) CAUTION in penicillin allergic patients	**Not on formulary and NOT stocked**
Cefradine (IV/PO) CAUTION in penicillin allergic patients	**Not on formulary and NOT stocked**
Ceftaroline (IV) CAUTION in penicillin allergic patients	**Microbiologist approval required in all cases**
Ceftazidime (IV) CAUTION in penicillin allergic patients	Hospital acquired pneumonia with severe signs or symptoms, or higher risk of resistance Cystic fibrosis
Ceftriaxone (IV) CAUTION in penicillin allergic patients	Acute Pyelonephritis, Complicated (upper) Urinary Tract Infection Catheter Associated Urinary Tract Epiglottitis Hospital acquired pneumonia with severe signs or symptoms, or higher risk of resistance Meningitis treatment (suspected or confirmed bacterial meningitis) Typhoid Sepsis of unknown origin in children over 3 months old Orbital cellulitis Peri-orbital cellulitis Medical prophylaxis for close contacts of Meningococcal disease Medical prophylaxis for close contacts of invasive *H. influenzae* type B disease
Cefuroxime (IV) CAUTION in penicillin allergic patients	Acute Pyelonephritis, Complicated (upper) Urinary Tract Infection in children over 3 months old Catheter Associated Urinary Tract Infection in children over 3 months old Aspiration Pneumonia Community acquired pneumonia with severe signs or symptoms Pneumonia secondary to influenza with severe signs or symptoms Cellulitis Erysipelas Peritonitis (surgical abdomen) Surgical prophylaxis
Cefuroxime axetil (PO) CAUTION in penicillin allergic patients	**Not on formulary and NOT stocked**

Agent (and route)	Permitted Indications
Chloramphenicol (IV)	**Microbiologist approval required in all cases** **FIRST DOSE of empirical treatment of suspected or confirmed bacterial meningitis IF there is a well-documented history of an anaphylactic reaction with a beta lactam antibiotic but URGENT DISCUSSION required with Consultant Microbiologist on-call due to toxicity concerns in infants.**
Chloramphenicol (topical)	Freely available
Ciprofloxacin (PO) CAUTION in children and growing adolescents	Quinolones cause arthropathy in the weight-bearing joints of immature animals and are therefore generally not recommended in children and growing adolescents. However, the significance of this effect in humans is uncertain and in some specific circumstances use of ciprofloxacin may be justified in children Bronchiectasis (non-cystic fibrosis) Campylobacter Salmonella (non-typhoid species) Typhoid Shigella dysentery Medical prophylaxis for close contacts of Meningococcal disease
Ciprofloxacin (IV) CAUTION in children and growing adolescents	Quinolones cause arthropathy in the weight-bearing joints of immature animals and are therefore generally not recommended in children and growing adolescents. However, the significance of this effect in humans is uncertain and in some specific circumstances use of ciprofloxacin may be justified in children Orbital cellulitis Only where (a) Ciprofloxacin use is indicated and/or (b) patient unable to take ANY oral medication • Bronchiectasis (non-cystic fibrosis) • Salmonella (non-typhoid species) • Typhoid • Shigella dysentery
Clarithromycin (IV/PO)	Freely available
Clindamycin (IV/PO)	Peritonsillar abscess Aspiration Pneumonia Cellulitis not near the eyes or nose Erysipelas not near the eyes or nose Surgical site infection Necrotising fasciitis Orbital cellulitis Peri-orbital cellulitis Osteomyelitis Septic Arthritis Surgical prophylaxis for ENT or Max Fax procedures
Co-amoxiclav (IV/PO) DO NOT use in penicillin allergic patients	Freely available

Agent (and route)	Permitted Indications
Co-fluampicil [Magnapen] DO NOT use in penicillin allergic patients	**Not on formulary and NOT stocked**
Colistin (IV)	**Microbiologist approval required in all cases**
Colistin (nebulised)	Cystic fibrosis
Co-trimoxazole (IV/PO)	Pertussis (treatment and prophylaxis) Pneumocystis prophylaxis and treatment
Daptomycin (IV)	**Microbiologist approval required in all cases**
Doripenem	**Not on formulary and NOT stocked**
Doxycycline (PO) DO NOT use in children <12years old DO NOT use in young pregnant women	Freely available
Ertapenem (IV) CAUTION in penicillin allergic patients	**Microbiologist approval required in all cases**
Erythromycin (IV/PO)	Prokinetic agent in complex cases
Fidaxomicin (PO)	**Microbiologist approval required in all cases**
Flucloxacillin (IV/PO) DO NOT use in penicillin allergic patients	Freely available
Fosfomycin (IV/PO)	**Microbiologist approval required in all cases**
Fusidic Acid (IV/PO)	**Microbiologist approval required in all cases**
Fusidic Acid (topical)	Freely available
Gentamicin (IV/IM)	Freely available
Imipenem/cilastatin (IV) CAUTION in penicillin allergic patients	**Microbiologist approval required in all cases**
Levofloxacin (IV/PO)	**Microbiologist approval required in all cases**
Levofloxacin (topical)	**Microbiologist approval required in all cases** Eye drop- Licensed for local treatment of infections
Linezolid (IV/PO)	**Microbiologist approval required in all cases**
Meropenem (IV) CAUTION in penicillin allergic patients	Necrotising fasciitis
Methenamine	**Not on formulary and NOT stocked**
Metronidazole (PO/PR/IV)	Freely available
Minocycline (PO) DO NOT use in children <12years old DO NOT use in young pregnant women	**Microbiologist approval required in all cases - expecting dermatology use only**
Moxifloxacin (PO/IV)	**Microbiologist approval required in all cases**
Moxifloxacin (topical)	**Microbiologist approval required in all cases**

Agent (and route)	Permitted Indications
	Eye drop- Licensed for local treatment of infections
Nalidixic Acid	**Not on formulary and NOT stocked**
Neomycin	**Not on formulary and NOT stocked**
Netilmicin	**Not on the formulary and NOT stocked**
Nitrofurantoin (PO)	Freely available
Norfloxacin	**Not on the formulary and NOT stocked**
Ofloxacin (PO)	Sexual Health only
Ofloxacin (topical)	Ophthalmology
Oxytetracycline (PO) DO NOT use in children <12years old DO NOT use in young pregnant women	Dermatology use only
Phenoxymethylpenicillin [Penicillin V] (PO) DO NOT use in penicillin allergic patients	Freely available
Piperacillin/tazobactam [Tazocin] (IV) DO NOT use in penicillin allergic patients	Bronchiectasis (non-cystic fibrosis) Hospital acquired pneumonia with severe signs or symptoms or higher risk of resistance Febrile Neutropenia (oncology/haematology)
Pivmecillinam (PO) DO NOT use in penicillin allergic patients	Resistant UTI if no other oral agent is suitable
Rifampicin (PO/IV)	Osteomyelitis Medical prophylaxis for close contacts of Meningococcal disease
Rifaximin (PO)	**Microbiologist approval required in all cases**
Streptomycin (IV)	**Indication(s) <u>not</u> listed below require Microbiologist approval.** TB
Sulfadiazine (PO)	Toxoplasmosis
Teicoplanin (IV)	Hospital acquired pneumonia if suspecting MRSA implicated Cellulitis if suspecting MRSA implicated Erysipelas if suspecting MRSA implicated Necrotising fasciitis Febrile Neutropenia (oncology/haematology) Osteomyelitis if suspecting MRSA implicated Septic arthritis if suspecting MRSA implicated Surgical prophylaxis for orthopaedic procedures
Telithromycin	**Not on the formulary and NOT stocked**

Agent (and route)	Permitted Indications
Temocillin (IV) DO NOT use in penicillin allergic patients	**Indication(s) not listed below require Microbiologist approval.** Proven ESBL infections
Ticarcillin/clavulanate DO NOT use in penicillin allergic patients	**Microbiologist approval required in all cases** Only made available during piperacillin/tazobactam shortage
Tigecycline (IV) DO NOT use in children <12years old DO NOT use in young pregnant women	**Microbiologist approval required in all cases**
Tinidazole	**Not on the formulary and NOT stocked**
Tobramycin (IV)	**Microbiologist approval required in all cases** Including for significant pseudomonas infection
Tobramycin (nebulised)	Cystic fibrosis Non cystic fibrosis bronchiectasis
Trimethoprim (PO)	Freely available
Vancomycin (IV)	Freely available
Vancomycin (PO)	Clostridium difficile infection only

3.5 Notes On Penicillin Allergy

"Penicillin allergy" appears to be very common in hospitalised patients, being listed amongst the known drug allergies in up to half of in-patients. In practice genuine penicillin allergy is significantly rarer.

Before any patient is labelled penicillin allergic, confirm that the allergy is genuine.

Symptom	Interpretation
Nausea, vomiting, abdominal pain:	Frequently accompany oral antibiotics use. These are not usually allergies.
Maculopapular rash developing several days into a course of antibiotics	May be a non-allergic rash, particularly common with amoxicillin given during EBV infection. Any features of Stevens-Johnson syndrome should result in immediate discontinuation of the drug and prohibition of use in the future.
Immediate onset angioedema, rhinitis, dyspnoea, wheeze, hypotension, etc.	These are very suspicious of IgE mediated allergy. Do not use any beta-lactam if a beta-lactam was the provoking drug. Do NOT use a "test dose" to "find out". Discuss cefalosporin or carbapenem use with Consultant Microbiologist.
"My mum told me I was allergic to penicillin, I don't know why"	Each case will need individual assessment. A specific IgE blood test for IgE against penicillin compounds is specific, but very insensitive. A negative penicillin `RAST' test therefore by no means excludes penicillin allergy.

Please note:

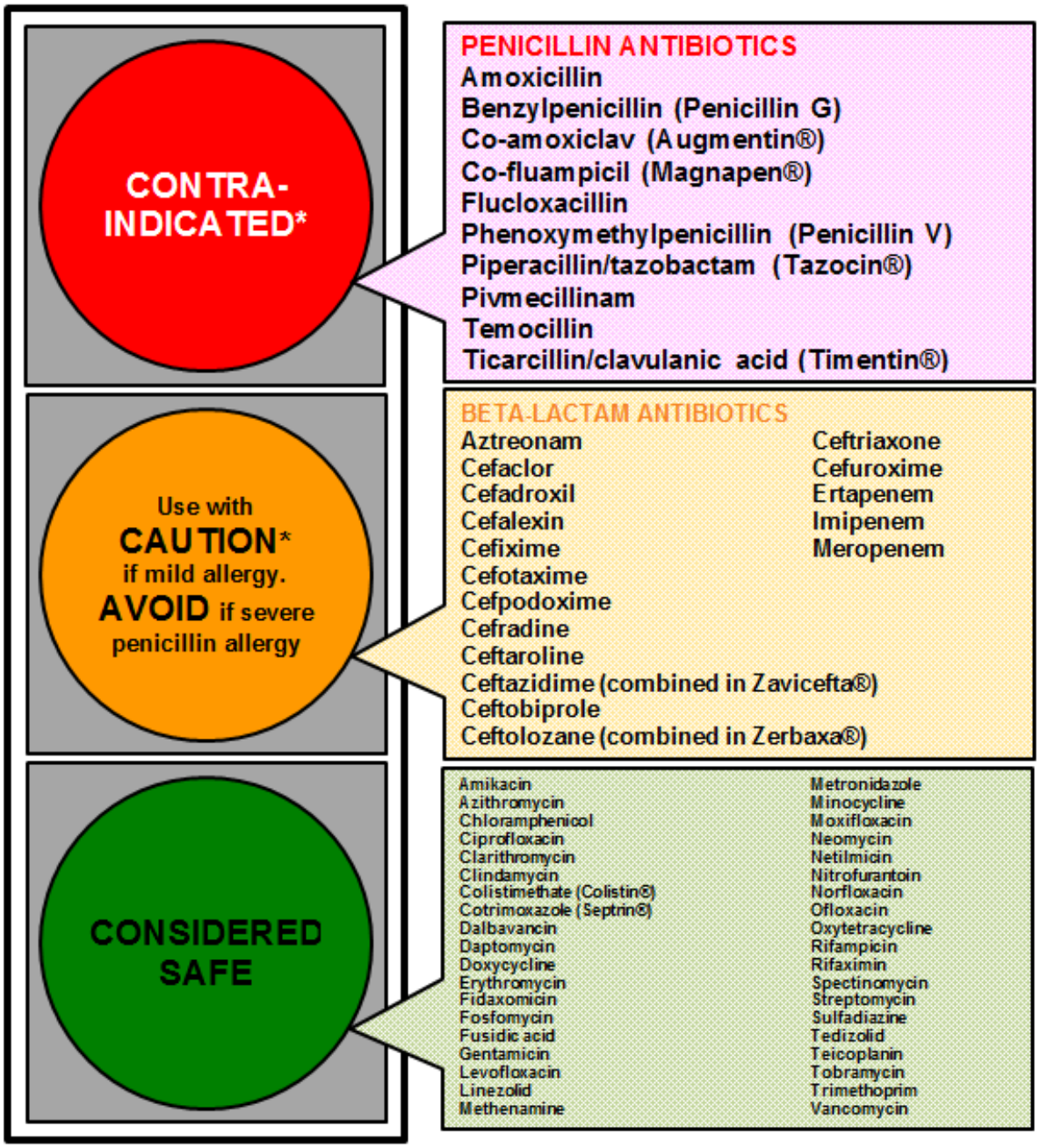
- Penicillin allergy is NOT inherited. Testing is NOT indicated even if a relative has true penicillin allergy.
- Skin testing for penicillin is the ‘gold standard’ but reagents for this have stopped being manufactured and this service cannot be offered by the Immunology Department at present time.
- A detailed history including timing and type of reaction is essential in assessing patients with possible drug allergy.

It is often valuable to check previous drug administration sheets to determine whether or not the patient has received a penicillin in the past without adverse effect.

PENICILLIN ALLERGY CAN KILL

Antibiotic prescribing in a penicillin allergic patient

- If patient only has a mild rash with a penicillin or a rash that appears >72 hours after administration, they may be able to safely tolerate another beta-lactam antibiotic (including cephalosporins, carbapenems and aztreonam) but proceed with caution.
- Patients with a severe penicillin allergy (anaphylaxis, urticaria or rash immediately after penicillin administration) SHOULD NOT receive a penicillin or any other beta-lactam antibiotic



*Please seek expert microbiology advice in cases of **severe** infections

3.5.1 Inadvertent administration of a beta-lactam based antibiotic to a patient with a history of adverse reactions to penicillin, with no apparent reaction.

Administration of a penicillin-based antibiotic to a patient with previously recorded adverse reaction **is a serious clinical error**, and all efforts to avoid it must be made. However, it is acknowledged that this error does occasionally occur, and the result can yield useful information which may be of benefit to the patient.

First there must be duty of candour – discuss the situation with the patient and apologise for the error. Involve the consultant in charge of the patient's care as soon as practical. Complete an incident report form (IR1).

Nature of previous reaction	Mechanism	Action to be taken
Anaphylaxis, angioedema, acute urticaria	Type 1 hypersensitivity	Inadvertent test of hypersensitivity. If no reaction at first dose, risk of reaction to subsequent doses is no greater than for the rest of the population. Reassure patient and re-label notes as not Type 1 hypersensitivity.
Stevens-Johnson syndrome, erythema multiforme, severe mouth ulcers, toxic epidermal necrolysis (TEN)	Delayed hypersensitivity, drug acts as a hapten	Stop the antibiotic immediately and discuss with a microbiologist. Careful history regarding timing of antibiotics in previous reaction needed – it may have been the underlying infection that caused the reaction.
Rash after amoxicillin for sore throat	Amoxicillin / EBV effect	Reassure. If symptoms recur, reclassify as delayed onset rash.
Delayed onset rash	T-cell mediated	If single dose only, switch to an alternative agent. If 2 or more doses, watch and manage symptoms if they occur. If no reaction, reassure and re-label.
Drug fever / serum sickness-like reaction	Immune complex / type III	Review need for antibiotics. Discuss alternatives with a microbiologist
Nausea, vomiting or diarrhoea	GI intolerance	Reassure patient. If symptoms recur, review need for antibiotics. Discuss alternatives with a microbiologist if necessary.
Clostridium difficile colitis or previous GDH positivity	Imbalance of GI flora	Review need for antibiotics. Discuss alternatives with a microbiologist
Thrush	Super-infection with *Candida* spp.	Should resolve on stopping antibiotics. Manage symptoms according to the antibiotic formulary.
HIV disease-related drug reaction	CD4 <200	Seek specialist advice.
Unknown	Unknown	If no reaction, continue antibiotic and watch for symptoms. If they occur, manage accordingly. If not, reassure and re-label.

If the patient is found not to be allergic to the agent administered, communicate the finding to the rest of the medical and nursing team, re-label the medical records and drug chart, explain to and reassure the patient, and inform the GP.

3.6 Therapeutic Drug Monitoring: Use of Gentamicin

3.6.1 Point of note when prescribing gentamicin

Gentamicin is often given in combination with other agents, either to support its activity or to broaden the spectrum of therapy. In systemic infections, gentamicin MUST be supported by other active therapy.

3.6.2 Background

Once daily dosing of gentamicin has been shown, in randomised clinical trials, to be as effective as multiple daily dosing regimens. Evidence suggests that, when compared to multiple daily dosing, aminoglycosides administered once daily also have a lower risk of nephrotoxicity and no greater risk of ototoxicity [1]. Despite the fact that the majority of these randomised controlled trials have been conducted in adults, the limited paediatric data available reflects these adult findings [2-6]. Most of these studies on once daily gentamicin in children have used a dose of 7mg/kg, and this is now the dose recommended in BNFc.

This document is intended to guide the prescribing and monitoring of once daily gentamicin therapy and should be used in preference to doses and monitoring schedules in BNFc.

3.6.3 Exclusion Criteria

DO NOT use this regimen in neonates, during pregnancy, any child who has ascites, cystic fibrosis, endocarditis, major burns, CNS infection, or following cardiac surgery. Use with **caution** in children with significant renal impairment and children concurrently on nephrotoxic drugs, when doses should be reduced (see sections below).

3.6.4 Dosage and Monitoring

Dose: 1 month to 18 years = 7 mg/kg per dose (usually, 24 hourly; see below).

Exceptions:
Dose for Haematology/Oncology patients and those currently on nephrotoxic drugs:

1 month to 12 years	= 6mg/kg per dose
>12 years	= 5mg/kg per dose

Gentamicin dosing in patients with renal impairment:

Give a one-off dose according to *estimated* GFR, where:

Estimated GFR (mL/min/1.73m^2) = 40 x height (cm) / serum creatinine (micromol/L)

eGFR (mL/min/1.73m^2)	One-off Gentamicin Dose
60-90	5 mg/kg
30-60	4 mg/kg
15-30	3 mg/kg
< 15 / Dialysis patient	2 mg/kg

Check the gentamicin level **18** hours after the first dose and await the result:

- If the level is > 1 mg/L recheck levels every 12 hours;
- Do not give any further doses of gentamicin until the level is ≤ 1mg/L.

Check U & Es and serum creatinine with each level to monitor renal function.

A 10 micromol/L or greater rise in creatinine from baseline indicates acute deterioration in renal function. STOP and reconsider treatment options.

Assess the child's fluid status daily specifically to ensure the child has adequate fluid intake and is passing sufficient amounts of urine.

Dose Calculation

Obtain an accurate recent bodyweight for the child – in kilograms.

If the child appears overweight, plot the weight on an age and gender appropriate growth chart. If the child's weight is more than the 98th percentile, use the weight at the 98th percentile to calculate the dose of gentamicin. If the child's weight falls below the 98th percentile, use their actual weight to calculate the dose of gentamicin.

Calculate the initial dose, using the child's actual bodyweight with the above caveat and the appropriate mg/kg. **The maximum dose in ANY circumstance MUST NOT exceed 400mg.**

Administration[7-8]:

Dilute the gentamicin dose in sodium chloride 0.9%* and give by slow IV infusion over 30 minutes.

Use 50mLs in most cases but 20mLs for PICU patients, fluid restricted children and those less than 1 year of age.

*5% glucose *may* be used; e.g. in children with hyperchloraemia.

Monitoring and dose adjustment:

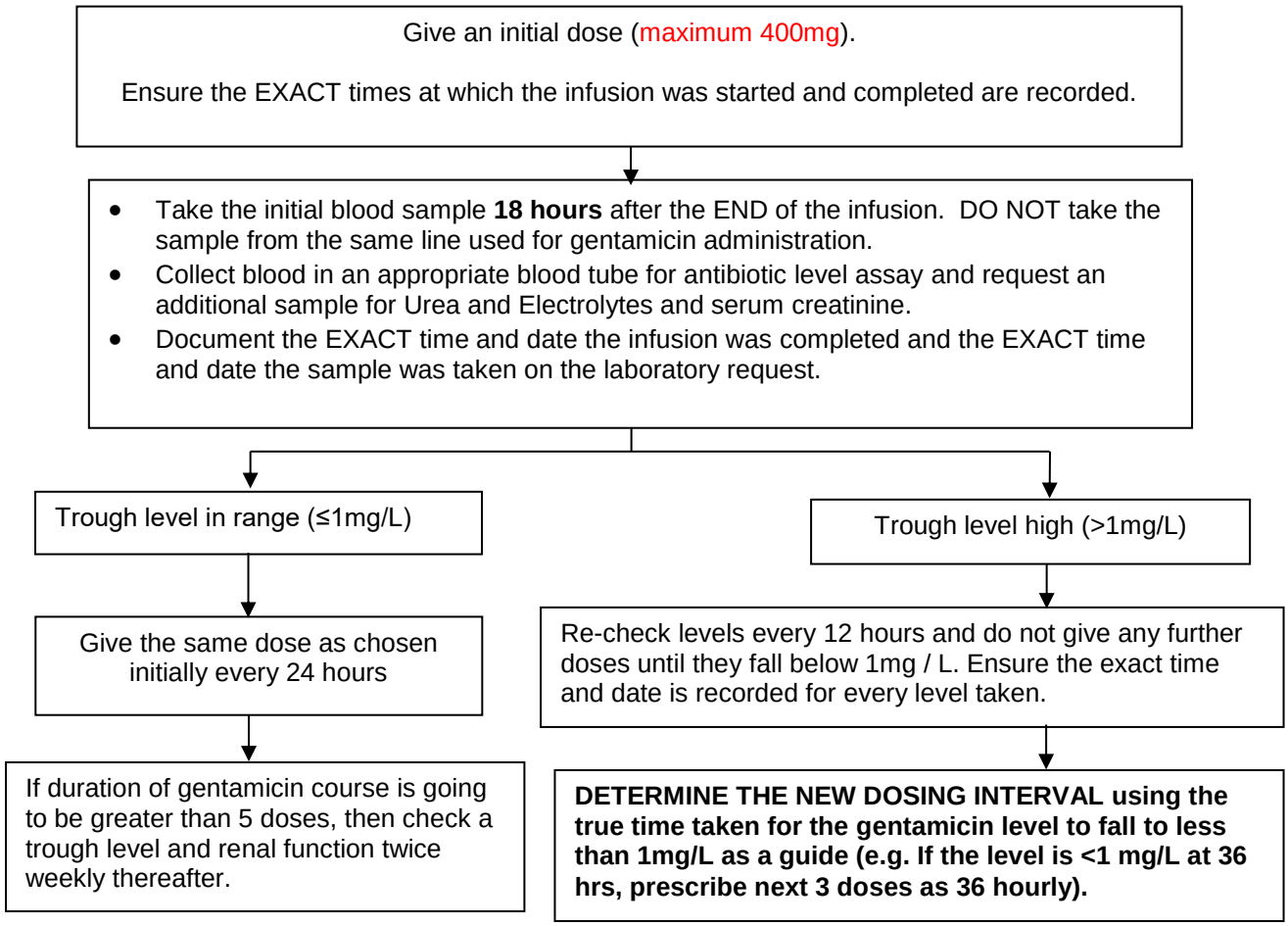
- Prescribe and give one dose initially (**maximum 400mg**) and wait for the blood-level before further doses are prescribed;
- Record the EXACT times at which the infusion was **started** and **completed**;
- Take the initial blood sample **18 hours after the END of the infusion**. DO NOT take the sample from the same line used for gentamicin administration;
- Collect blood sample in the appropriate blood tube for antibiotic level assay and request an additional sample for Urea and Electrolytes and serum creatinine;
- Record the following on the Gentamicin Prescription and Administration Record and laboratory request form:
    1. Exact time dose started and completed.
    2. Exact time post dose that the sample was taken.
    3. Always annotate the form with 'Once daily High Dose gentamicin.'
- Check the level result:
    - Trough level in range (≤1mg/L); give the same dose as chosen initially every 24 hours;
    - Trough level high (>1mg/L); re-check levels **every 12 hours** until they fall below 1mg/L. Ensure that the date and exact time post-dose is recorded for every level taken.
    - **Determine the new dosing interval using the true time taken for the gentamicin level to fall to less than 1mg/L as a guide** (e.g. If the level is <1 mg/L at 36 hours, prescribe the next 3 doses as 36 hourly). There is no absolute maximum dose interval.

As above, check U&Es and serum creatinine with each level done and **STOP and reconsider treatment options,** if there is a **10 micromol/L or greater rise in serum creatinine,** indicating acute deterioration in renal function.

Further levels:

- Monitor serum creatinine (using eGFR) when starting gentamicin and then twice weekly thereafter. If the patient is unstable, monitor more frequently;
- If the child's renal function is stable and in the normal range and the initial level is ≤1mg/L, further gentamicin levels do not need to be taken before each next dose;
- However, if the duration of the gentamicin course is going to be greater than 5 doses, check a trough level and renal function twice weekly thereafter;
- If renal function is impaired or fluctuating and the initial trough level is >1mg/L, recheck levels every 12 hours after each dose;
- Do not give any further doses of gentamicin until the level is ≤ 1mg/L. See algorithm below:

3.6.5 Summary Monitoring and Dose Adjustments Algorithm



NB: Any deviations from the guideline should only be made based on the advice of senior medical staff, a Microbiologist or Pharmacist and these should be documented clearly in the patient medical notes.

3.6.6 Contra-indications and Warnings

- The narrow spectrum of activity of gentamicin must be kept in mind, as used alone it provides no cover for streptococci or anaerobes.
- Lower doses of gentamicin given more than once a day and in combination with other antibiotics are recommended in endocarditis.
- The once daily regimen should be used with extreme caution in patients with renal impairment or in patients receiving other nephrotoxic drugs. Seek specialist advice from a Microbiologist or Antimicrobials Pharmacist.

- Assess the child's fluid status daily specifically to ensure that the child has adequate fluid intake and is passing sufficient amounts of urine.

- Approach with extra caution in children with urinary outflow problems (bladder obstruction, urinary retention) renal impairment or dehydration.

3.6.7 Side Effects

Nephrotoxicity and ototoxicity may occur if optimum blood levels are exceeded.

References

1. Barza M, Ioannidis J, Cappelleri JC, Lau J. Single or multiple daily doses of aminoglycosides: a meta-analysis. British Medical Journal 1996;312:338-344.

2. Bass KD, Larkin SE, Paap C, Haase GM. Pharmacokinetics of once-daily gentamicin dosing in pediatric patients. Journal of Pediatric Surgery 1998;33(7):1104-7.

3. Elhanan K, Siplovich L, Raz R. Gentamicin once daily versus thrice daily in children. Journal of Antimicrobial Chemotherapy 1995;35(2):327-32.

4. Ujitendaal EV, Rademaker CM, Schobben AFAM et al, Once vs multiple daily gentamicin in infants and children. Ther Drug Monit 2001; 23: 506 – 513.

5. Tomlinson RJ, Ronghe M, Goodbourne C, Price C, Lilleyman JS, Das S et al. Once daily ceftriaxone and gentamicin for the treatment of febrile neutropenia. Archives of Disease in Childhood 1999;80:125-131.

6. Thomson AH. Once daily aminoglycosides in children. Paediatric and Perinatal Drug Therapy 1997;1:66-70.

7. Email communication from Sian Shenton, Specialist Paediatric Pharmacist, Leeds Teaching Hospitals, on: Gentamicin (Intravenous Extended Interval) Paediatric (Children older than 28 days) Regimen, on: LTH eMeds e-prescribing and medicines management system. Accessed on 24th July 2020.

8. Email communication from Peter Foxon, Senior Clinical Pharmacist, Governance and Paediatrics, Nottingham University Hospitals, on: NUH NHS Trust Guidelines, v3.0. Accessed on 21st July 2020.

4 Empirical Antimicrobial Chemotherapy

4.1 Urinary Tract Infections

- Lower Urinary Tract Infection
- Acute pyelonephritis, Complicated (Upper) Urinary Tract Infection
- Recurrent Urinary Tract Infection
- Catheter Associated Urinary Tract Infection

Lower Urinary Tract Infection[1]	First Line Choices[2]	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
Under 3 months (Refer to paediatric specialist and treat with intravenous antibiotics in line with the NICE guideline NG143 on fever in under 5s)[3]	**Ceftriaxone**[4] IV CAUTION in penicillin allergic patients **Cefotaxime** IV CAUTION in penicillin allergic patients	Discuss with Consultant Microbiologist
Over 3 months	**Nitrofurantoin** oral See renal note below[5] **Trimethoprim** oral (if low risk of resistance[6]) **DURATION: 3 days**	**Cefalexin** oral CAUTION in penicillin allergic patients **Amoxicillin** oral/IV (only if culture results available and susceptible). DO NOT use in penicillin allergic patients **DURATION: 3 days**

Notes

1. NICE Guideline NG109: Urinary tract infection (lower): antimicrobial prescribing. October 2018. https://www.nice.org.uk/guidance/ng109
2. Check any previous urine culture and susceptibility results and antibiotic prescribing and choose antibiotics accordingly. Where a child or young person is receiving prophylactic antibiotics, treatment should be with a different antibiotic, not a higher dose of the same antibiotic.
3. NICE Guideline NG143: Fever in under 5s: assessment and initial management. November 2019. https://www.nice.org.uk/guidance/ng143
4. Ceftriaxone is not suitable for premature babies, babies with jaundice, hypoalbuminaemia or acidosis as it may exacerbate hyperbilirubinaemia. Also, do not use if calcium-containing infusions are being administered. Use cefotaxime instead.
5. Avoid if estimated glomerular filtration rate less than 45 mL/minute. May be used with caution if estimated glomerular filtration rate 30–44 mL/minute as a short-course only (3 to 7 days), to treat uncomplicated lower urinary-tract infection caused by suspected or proven multidrug resistant bacteria and only if potential benefit outweighs risk. https://bnf.nice.org.uk/drug/nitrofurantoin.html#renalImpairment
6. A lower risk of resistance may be more likely if not used in the past 3 months, previous urine culture suggests susceptibility (but this was not used), and in younger people in areas where local epidemiology data suggest resistance is low. A higher risk of resistance may be more likely with recent use.

Acute Pyelonephritis, Complicated (upper) Urinary Tract Infection[1]	**First Line Choices[2]**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Under 3 months (Refer to paediatric specialist and treat with intravenous antibiotics in line with the NICE guideline NG143 on fever in under 5s)[3.]	**Ceftriaxone[4]** IV CAUTION in penicillin allergic patients **Cefotaxime** IV CAUTION in penicillin allergic patients	Discuss with Consultant Microbiologist
Over 3 months	**Cefalexin** oral CAUTION in penicillin allergic patients **Co-amoxiclav** oral (only if culture results available and susceptible) DO NOT use in penicillin allergic patients **DURATION: 7-10 days**	**Ceftriaxone[4]** IV CAUTION in penicillin allergic patients **Cefuroxime** IV CAUTION in penicillin allergic patients **Gentamicin** IV[5] **DURATION: Review IV to oral at 48 to 72 hours, complete 7-10 days in total**

Notes

1. NICE Guideline NG111: Pyelonephritis (acute): antimicrobial prescribing. October 2018. https://www.nice.org.uk/guidance/ng111
2. Check any previous urine culture and susceptibility results and antibiotic prescribing and choose antibiotics accordingly. Where a child or young person is receiving prophylactic antibiotics, treatment should be with a different antibiotic, not a higher dose of the same antibiotic.
3. NICE Guideline NG143: Fever in under 5s: assessment and initial management. November 2019. https://www.nice.org.uk/guidance/ng143
4. Ceftriaxone is not suitable for premature babies, babies with jaundice, hypoalbuminaemia or acidosis as it may exacerbate hyperbilirubinaemia. Also, do not use if calcium-containing infusions are being administered. Use other options listed or cefotaxime instead.
5. Therapeutic drug monitoring and assessment of renal function is required. https://bnfc.nice.org.uk/drug/gentamicin.html Specific information on gentamicin drug dosing and monitoring is given in Section 3.6.4 of this guideline.

Recurrent Urinary Tract Infection[1]	**First Line Choices[2]**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Under 3 months	Refer to paediatric specialist	Discuss with Consultant Microbiologist
Over 3 months On specialist advice only	**Trimethoprim** oral (prophylactic dosing) **Nitrofurantoin** oral (prophylactic dosing) **DURATION: 3 months then seek review with specialist**	**Cefalexin** oral (prophylactic dosing) CAUTION in penicillin allergic patients **Amoxicillin[3]** oral (prophylactic dosing) DO NOT use in penicillin allergic patients **DURATION: 3 months then seek review with specialist**

Notes

1. NICE Guideline NG112: Urinary tract infection (recurrent): antimicrobial prescribing. October 2018 https://www.nice.org.uk/guidance/ng112
2. Choose antibiotic according to recent culture and susceptibility results where possible, with rotational use based on local policies. Select a different antibiotic for prophylaxis if treating an acute UTI.
3. Amoxicillin is not licensed for preventing UTIs, so use for this indication would be off-label.

Catheter Associated Urinary Tract Infection[1]	**First Line Choices[2]**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Under 3 months (Refer to paediatric specialist and treat with intravenous antibiotics in line with the NICE guideline NG143 on fever in under 5s)[3]	Refer to paediatric specialist	Discuss with Consultant Microbiologist
Over 3 months	**Trimethoprim** oral (if low risk of resistance[4]) **Cefalexin** oral CAUTION in penicillin allergic patients **Amoxicillin** oral/IV (only if culture results available and susceptible). DO NOT use in penicillin allergic patients **DURATION: 10 days**	**Co-amoxiclav** oral/IV (only if culture results available and susceptible). DO NOT use in penicillin allergic patients **Ceftriaxone**[4,5] IV CAUTION in penicillin allergic patients **Cefuroxime** IV CAUTION in penicillin allergic patients **Gentamicin** IV[6] **DURATION: Review IV to oral at 48 to 72 hours, complete 10 days in total**

Notes

1. NICE Guideline NG113: Urinary tract infection (catheter-associated): antimicrobial prescribing. November 2018. https://www.nice.org.uk/guidance/ng113

2. Check any previous urine culture and susceptibility results and antibiotic prescribing and choose antibiotics accordingly. Where a child or young person is receiving prophylactic antibiotics, treatment should be with a different antibiotic, not a higher dose of the same antibiotic.

3. NICE Guideline NG143: Fever in under 5s: assessment and initial management. November 2019. https://www.nice.org.uk/guidance/ng143

4. A lower risk of resistance may be more likely if not used in the past 3 months, previous urine culture suggests susceptibility (but this was not used), and in younger people in areas where local epidemiology data suggest resistance is low. A higher risk of resistance may be more likely with recent use.

5. Ceftriaxone is not suitable for premature babies, babies with jaundice, hypoalbuminaemia or acidosis as it may exacerbate hyperbilirubinaemia. Also, do not use if calcium-containing infusions are being administered. Use other options listed or cefotaxime instead.

6. Therapeutic drug monitoring and assessment of renal function is required https://bnfc.nice.org.uk/drug/gentamicin.html Specific information on gentamicin drug dosing and monitoring is given in Section 3.6.4 of this guideline.

4.2 Ear Nose and Throat Infections

- Acute sore throat (including pharyngitis and tonsillitis)
- Peritonsillar abscess
- Acute otitis media
- Sinusitis
- Epiglottitis

Acute Sore Throat[1] (including pharyngitis and tonsillitis)	**First Line Choices**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Acute sore throat is usually caused by a viral infection and is self-limiting. Symptoms can last for around 1 week, and most people will improve within this time without treatment with antibiotics, regardless of the cause.		
Antibacterial therapy is required only in patients with severe systemic symptoms, signs and symptoms of a more serious illness or condition, or those at high risk of complications.	**Phenoxymethylpenicillin[2]** oral DO NOT use in penicillin allergic patients **DURATION: 5-10 days[4]**	**Clarithromycin[3]** oral **Erythromycin[3]** oral **DURATION: 5 days**

Notes

1. NICE Guideline NG84: Sore throat (acute): antimicrobial prescribing. January 2018. https://www.nice.org.uk/guidance/ng84
2. Note: Avoid amoxicillin if possibility of glandular fever, and in light of resistance issues
3. Erythromycin is preferred in young women who are pregnant.
4. Five days of phenoxymethylpenicillin may be enough for symptomatic cure; but a 10-day course may increase the chance of microbiological cure.

Peritonsillar abscess	**First Line Choices**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Needle aspiration is gold standard of treatment Cover for oral anaerobic organisms is required	**Benzylpenicillin[1]** IV **PLUS** **Metronidazole[1]** IV DO NOT use in penicillin allergic patients (Switch to Co-amoxiclav oral once stable) DO NOT use in penicillin allergic patients **DURATION[2]: Review IV to oral at 48 to 72 hours, complete 7-10 days in total**	**Clindamycin** oral/IV **DURATION[2]: Review IV to oral at 48 to 72 hours, complete 7-10 days in total**

Notes

1. Oral switch to Co-amoxiclav or can opt for clindamycin
2. If Group A Streptococcus implicated, treat for 10 days

Acute otitis media[1]	First Line Choices	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
Most cases are self-limiting and will get better within 3 days without antibiotics. Analgesia is recommended. Antibiotics advised where no improvement by day 3, or where complications (i.e. mastoiditis)	**Amoxicillin** oral DO NOT use in penicillin allergic patients **DURATION: 5-7 days**	**Clarithromycin**[2] oral **Erythromycin**[2] oral **Co-amoxiclav**[3] oral DO NOT use in penicillin allergic patients **DURATION: 5-7 days**

Notes

1. NICE Guideline NG91: Otitis media (acute): antimicrobial prescribing. March 2018. https://www.nice.org.uk/guidance/ng91
2. Erythromycin is preferred in young women who are pregnant.
3. Second choice, if worsening symptoms on first choice taken for at least 2 to 3 days. If patient is penicillin allergic, consult Consultant Microbiologist or Antimicrobial Pharmacist to discuss options.

Sinusitis[1]	First Line Choices	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
The usual course of sinusitis is 2-3 weeks, most cases will resolve without antibiotics. Treatment is indicated if symptoms worsen rapidly or significantly, do not improve after 3 weeks, or they become systemically very unwell.		
Symptom relief for fever and pain is advised. Steroid nasal spray can be considered for children over 12 years of age	**Phenoxymethylpenicillin** oral DO NOT use in penicillin allergic patients **Co-amoxiclav**[2] oral DO NOT use in penicillin allergic patients **DURATION: 5 days**	**Clarithromycin** oral **Doxycycline**[3] oral DO NOT use in children <12years old **DURATION: 5 days**

Notes

1. NICE Guideline NG79: Sinusitis (acute): antimicrobial prescribing. October 2017. https://www.nice.org.uk/guidance/ng79
2. First choice if systemically unwell or second choice if worsening symptoms on first choice taken for at least 2 to 3 days. If patient is penicillin allergic, or not improving on co-amoxiclav, consult Consultant Microbiologist or Antimicrobial Pharmacist to discuss options.
3. Doxycycline is contraindicated in children under 12 years and in pregnancy.

Epiglottitis[1]	First Line Choices	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
An airway emergency, especially in children. Start IV antibiotics. Once the airway has been secured and antibiotics have been initiated, the condition usually resolves rapidly.	**Co-amoxiclav** oral/IV DO NOT use in penicillin allergic patients **Ceftriaxone** IV CAUTION in penicillin allergic patients (Switch to Co-amoxiclav oral once stable) **DURATION: Review IV to oral at 48 to 72 hours, complete 7-10 days in total**	In case of penicillin anaphylaxis, please discuss with a consultant microbiologist**.** **DURATION: Review IV to oral at 48 to 72 hours, complete 7-10 days in total**

Notes

1) BMJ Best practice: Epiglottitis Last reviewed February 2020. https://bestpractice.bmj.com/topics/en-gb/452

4.3 Lower Respiratory Infections

- Bronchiolitis
- Acute Cough (including bronchitis)
- Bronchiectasis (non-cystic fibrosis)
- Cystic fibrosis exacerbation
- Aspiration pneumonia
- Community acquired pneumonia
  - Early onset
  - Secondary to viral chest infection (i.e., influenza)
  - Mycoplasma or chlamydia suspected
- Pneumonia secondary to influenza
- Hospital acquired pneumonia
  - Early onset
  - Late onset
- Pertussis
- Tuberculosis

Bronchiolitis[1-4]	**First Line Choices**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Occurs in children under 2 years of age, most often between 3 and 6 months. Symptoms peak at day 3-5, and usually resolve within 3 weeks for infants.	Antibiotics not recommended	See guidelines for acute cough/bronchitis if appropriate
Notes 1. NICE Guideline NG9: Bronchiolitis in children: diagnosis and management. June 2015 https://www.nice.org.uk/guidance/ng9 2. British Thoracic Society hyperlink to bronchiolitis in children reposts to NICE NG9 https://www.brit-thoracic.org.uk/quality-improvement/guidelines/bronchiolitis-in-children/) 3. NICE Pathways for Bronchiolitis in children. Last updated November 2019 https://pathways.nice.org.uk/pathways/bronchiolitis-in-children 4. NICE https://www.nice.org.uk/guidance/cg69/evidence/full-guideline-pdf-196853293		

Acute cough (including bronchitis)[1,2]	**First Line Choices**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Usually viral and self-limiting, and gets better within 3-4 weeks without antibiotics. For children under 5 with an acute cough and fever, follow the NICE guideline on fever in under 5s.	**Amoxicillin** oral DO NOT use in penicillin allergic patients **DURATION: 5 days**	**Clarithromycin**[3] oral **Erthyromycin**[3] oral For children less than 1 years old **Doxycycline**[4] oral DO NOT use in children <12years old **DURATION: 5 days**
Notes 1. NICE Guideline NG120: Cough (acute): antimicrobial prescribing. February 2019. https://www.nice.org.uk/guidance/ng120 2. NICE Guideline NG143: Fever in under 5s: assessment and initial management. November 2019. https://www.nice.org.uk/guidance/ng143 3. Erythromycin is preferred in young women who are pregnant. 4. Doxycycline is contraindicated in children under 12 years and in pregnancy.		

Bronchiectasis (non-cystic fibrosis)[1,2]	First Line Choices	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
Acute exacerbation of bronchiectasis is a sustained worsening of symptoms from the patient's stable state. Do not routinely offer antibiotic prophylaxis to prevent acute exacerbations of bronchiectasis. Seek specialist input.	**Amoxicillin** oral DO NOT use in penicillin allergic patients **Clarithromycin**[3] oral **Doxycycline**[4] oral DO NOT use in children <12years old **DURATION**[7]**: 7-14 days**	**Co-amoxiclav**[5] oral/IV DO NOT use in penicillin allergic patients **Piperacillin/tazobactam**[6] IV DO NOT use in penicillin allergic patients **Ciprofloxacin**[8,9] oral/IV With specialist advice **DURATION**[7]**: Review IV to oral at 48 to 72 hours, complete 7-14 days in total**

Notes

1. NICE Guideline NG117: Bronchiectasis (non-cystic fibrosis), acute exacerbation: antimicrobial prescribing. December 2018. https://www.nice.org.uk/guidance/ng117
2. NICE Guideline NG143: Fever in under 5s: assessment and initial management. November 2019. https://www.nice.org.uk/guidance/ng143
3. Erythromycin is preferred in young women who are pregnant.
4. Doxycycline is contraindicated in children under 12 years and in pregnancy.
5. An empirical option if child at higher risk of treatment failure. Review should be guided by sputum culture and susceptibilities where possible.
6. Guided by culture and sensitivities, or empirically if not responding to co-amoxiclav
7. Course length based on an assessment of the severity of bronchiectasis, exacerbation history, severity of exacerbation symptoms, previous culture and susceptibility results, and response to treatment.
8. Quinolones cause arthropathy in the weight-bearing joints of immature animals and are therefore generally not recommended in children and growing adolescents. However, the significance of this effect in humans is uncertain and in some specific circumstances use of ciprofloxacin may be justified in children. https://bnf.nice.org.uk/drug/ciprofloxacin.html#importantSafetyInformations
9. See MHRA advice for restrictions and precautions for using fluoroquinolone antibiotics due to very rare reports of disabling and potentially long-lasting or irreversible side effects affecting musculoskeletal and nervous systems. Warnings include: stopping treatment at first signs of a serious adverse reaction (such as tendonitis, seizures), and prescribing with special caution, and avoiding co-administration with a corticosteroid. March 2019.

Cystic fibrosis exacerbation[1-4]	First Line Choices	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
Respiratory sample cultures are very important	**Seek specialist advice**	**Seek specialist advice**

Notes

1. NICE Guideline NG78: Cystic fibrosis: diagnosis and management. October 2017. https://www.nice.org.uk/guidance/ng78
2. NICE Technology appraisal guidance: Colistimethate sodium and tobramycin dry powders for inhalation for treating pseudomonas lung infection in cystic fibrosis. March 2013. https://www.nice.org.uk/guidance/ta276
3. NICE Evidence summary [ESUOM37] Cystic fibrosis: long-term azithromycin. November 2014. https://www.nice.org.uk/advice/esuom37/chapter/Key-points-from-the-evidence
4. Cystic Fibrosis Trust. Consensus documents for clinicians and allied healthcare professionals. https://www.cysticfibrosis.org.uk/the-work-we-do/resources-for-cf-professionals/consensus-documents

Aspiration Pneumonia[1]	**First Line Choices**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Note: seek specialist advice for patients with cystic fibrosis, and where known pseudomonas colonisation in neurodisability	**Co-amoxiclav** IV DO NOT use in penicillin allergic patients **DURATION: 5-7 days**	**Cefuroxime[2]** IV **and Metronidazole** IV CAUTION in penicillin allergic patients **Clindamycin[3]** IV **DURATION: 5-7 days**

Notes

1. Current practice at both ULHT and NLaG, as advised by Paediatric Consultants/Pharmacists.
2. Can use in mild penicillin allergy, not advised in severe unless patient has tolerated a beta-lactam containing antibiotic previously.
3. If severe penicillin allergy, and contact microbiologist on-call for further advice on choice of antibiotics.

Community acquired pneumonia[1]	**First Line Choices[2]**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
If child is under 1 month old	Refer to paediatric specialist	
Over 1 month old and non-severe signs or symptoms	**Amoxicillin** oral DO NOT use in penicillin allergic patients **DURATION[5]: 5 days**	**Clarithromycin[3]** oral **Erythromycin[3]** oral **Doxycycline[4]** oral DO NOT use in children <12years old **DURATION[5]: 5 days**
Over 1 month old and severe signs or symptoms	**Co-amoxiclav[2]** oral/IV DO NOT use in penicillin allergic patients **IF** atypical pathogen suspected[6]: add clarithromycin[6], and undertake urinary antigen testing to support review at 48hours **DURATION[5]: 5 days**	**Cefuroxime** IV CAUTION in penicillin allergic patients **IF** atypical pathogen suspected[6]: add clarithromycin[6], and undertake urinary antigen testing to support review at 48hours For severely penicillin allergic patients, discuss choices with Consultant Microbiologist on-call

Notes

1. NICE Guideline NG138: Pneumonia (community-acquired): antimicrobial prescribing. September 2019. https://www.nice.org.uk/guidance/ng138
2. Oral antibiotics if patient can take oral medicines. If severe, use intravenous antibiotics.
3. Erythromycin is preferred in young women who are pregnant.
4. Doxycycline is contraindicated in children under 12 years and in pregnancy.
5. Stop antibiotic treatment after 5 days unless microbiological results suggest a longer course length is needed or the person is not clinically stable.
6. *Mycoplasma pneumoniae* infection occurs in outbreaks approximately every 4 years and is more common in school-aged children.

Pneumonia secondary to influenza[1.]	**First Line Choices[2]**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
If child is under 1 month old	Refer to paediatric specialist	
Over 1 month old and non-severe signs or symptoms	**Co-amoxiclav[2]** oral/IV DO NOT use in penicillin allergic patients **DURATION[5]: 5 days**	**Clarithromycin[3]** oral **Doxycycline[4]** oral DO NOT use in children <12years old Discuss choices with Consultant Microbiologist on-call **DURATION[5]: 5 days**
Over 1 month old and severe signs or symptoms	**Co-amoxiclav[2]** oral/IV DO NOT use in penicillin allergic patients **DURATION[5]: 5 days**	**Cefuroxime** IV CAUTION in penicillin allergic patients For severely penicillin allergic patients, discuss choices with Consultant Microbiologist on-call

Notes

1. NICE Guideline NG138: Pneumonia (community-acquired). September 2019. https://www.nice.org.uk/guidance/ng138 Antimicrobial prescribing recommends that when reassessing young people and children, consider possible non-bacterial causes, such as flu. Please consider rationale carefully, including whether there is evidence indicating potential bacterial infection. Revisit this rationale when results of investigations become available.
2. Give oral antibiotics first line if the person can take oral medicines. If severe, treat with intravenous antibiotics.
3. Erythromycin is preferred in young women who are pregnant.
4. Doxycycline is contraindicated in children under 12 years and in pregnancy.
5. Stop antibiotic treatment after 5 days unless microbiological results suggest a longer course length is needed or the person is not clinically stable.

Hospital acquired pneumonia[1]	**First Line Choices[2,3,4]**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
If child is under 1 month old	Refer to paediatric specialist and seek advice from Consultant Microbiologist on-call	
Over 1 month old and non-severe signs or symptoms and not at higher risk of resistance[5]	**Co-amoxiclav[3]** oral/IV DO NOT use in penicillin allergic patients **DURATION[8.]: 5 days then review**	**Clarithromycin[6]** oral **DURATION[8]: 5 days then review**
Over 1 month old and severe signs or symptoms or higher risk of resistance[5]	**Piperacillin/tazobactam** IV DO NOT use in penicillin allergic patients **DURATION[8]: 5 days then review**	**Ceftriaxone[7]** IV CAUTION in penicillin allergic patients **Ceftazidime** IV CAUTION in penicillin allergic patients **DURATION[8]: 5 days then review**
IF (suspected or confirmed) MRSA infection Manage with dual therapy with the IV antibiotic chosen from the options above	**ADD in Teicoplanin** IV **DURATION[8]: 5 days then review**	**ADD in Vancomycin** IV **DURATION[8]: 5 days then review**

Notes

1. NICE Guideline NG139: Pneumonia (hospital-acquired): antimicrobial prescribing September 2019. https://www.nice.org.uk/guidance/ng139
2. Antibiotic choice should be based on: • severity of signs/symptoms • early/late onset of symptoms • risk of complications • recent antibiotic use • recent microbiology results • recent hospital discharge • risk of adverse effects, including *Clostridium difficile* infection.
3. Give oral antibiotics first line if the person can take oral medicines, and the severity of their condition does not require intravenous antibiotics.
4. Send a sample (for example, sputum sample, nasopharyngeal swab or tracheal aspirate) for microbiological testing.
5. Higher risk of resistance includes late onset (>5 days after hospital admission), relevant comorbidity such as severe lung disease or immunosuppression, severe neurodisability, recent use of broad-spectrum antibiotics, colonisation with multidrug-resistant bacteria, and recent contact with a health or social care setting before current admission.
6. Erythromycin is preferred in young women who are pregnant.
7. Ceftriaxone is not suitable for premature babies, babies with jaundice, hypoalbuminaemia or acidosis as it may exacerbate hyperbilirubinaemia. Also, do not use if calcium-containing infusions are being administered. Use alternative option listed instead.
8. Treat with at least 5 days of antibiotics, then consider stopping antibiotics if clinically stable. Review intravenous antibiotics by 48 hours and consider IV to oral switch if possible.

Pertussis[1,2]	**First Line Choices[3]**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Incubation period around 7 days, and infectious for 3 weeks after symptoms show. Prescribe antibiotic for all suspected or confirmed cases with onset of cough within the past 21 days.	**Clarithromycin[3,4]** oral **DURATION: 7 days**	**Azithromycin** oral See dosing table on page **DURATION[5]: 3 days**
If unable to tolerate a macrolide or contraindicated	**Co-trimoxazole[3]** oral/IV NOT LICENSED for use in children under 6 weeks old **DURATION: 7 days**	Discuss choices with Consultant Microbiologist on-call

Notes

1. NICE Clinical knowledge summary: Whooping Cough. June 2018. https://cks.nice.org.uk/whooping-cough#!topicSummary
2. PHE Guidelines for the Public Health management of Pertussis in Englan. May 2018. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/762766/Guidelines_for_the_Public_Health_management_of_Pertussis_in_England.pdf
3. Give oral antibiotics first line if the person can take oral medicines. If severe, treat with intravenous antibiotics.
4. Erythromycin is preferred in young women who are pregnant.
5. Azithromycin course length is shorter as this drug has a longer half-life.

Tuberculosis[1]	**First Line Choices[2]**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Refer to TB specialist		

Notes

1. NICE Guideline NG33: Tuberculosis. January 2016. https://www.nice.org.uk/guidance/ng33

4.4 Skin & soft tissues

Impetigo[1]	**First Line Choices**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Localised non-bullous impetigo *where patient is not systemically unwell and risk of complications is low*	**Hydrogen peroxide 1%** **Apply two or three times a day for 5 days[2]**	**Fusidic acid 2%** - if hydrogen peroxide unsuitable (for example, if impetigo is around eyes) or ineffective[3] **Apply three times a day for 5 days[2]** **Mupirocin 2%** - if fusidic acid resistance suspected or confirmed[3,4] **Apply three times a day for 5 days[2].**
Widespread non-bullous impetigo *where patient is not systemically unwell and risk of complications is low*	Offer a short course of a topical **OR** oral antibiotic as equally effective at treating impetigo (see recommendations made above and below, for prescribing advice). Consider patient preference (parent or carer if appropriate), including practicalities of administration (particularly to large areas) and possible adverse effect. Take into account previous use of topical antibiotics, because antimicrobial resistance can develop rapidly with extended or repeated use.	
Bullous impetigo or impetigo in people who are systemically unwell or have high risk of complications	**Flucloxacillin[5,6]** oral DO NOT use in penicillin allergic patients **DURATION[2]: 5 days**	**Clarithromycin[5,6,7]** oral **DURATION[2]: 5 days**
IF (suspected or confirmed) MRSA infection	Discuss with Consultant Microbiologist	

Notes

1. NICE Guideline NG153: Impetigo: antimicrobial prescribing. February 2020. https://www.nice.org.uk/guidance/ng153
2. A five-day course is appropriate for most people with impetigo but can be increased to 7 days based on clinical judgement, depending on the severity and number of lesions.
3. As with all antibiotics, extended or recurrent use of topical fusidic acid or mupirocin may increase the risk of developing antimicrobial resistance. See BNF for Children for more information.
4. Licenses for use in infants vary between products. See individual summaries of product characteristics for details.
5. Higher end of the dosing range is recommended if needed for severe infections.
6. If known or suspected MRSA, please contact Consultant Microbiologist on-call for advice.
7. Erythromycin is preferred in young women who are pregnant.

Insect bites and stings[1]	First Line Choices	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
Do not offer an antibiotic for an insect bite or sting if no symptoms or signs of an infection.	Consider oral antihistamines (if child is over 1 year old) to help relieve itching. Note: there is uncertainty about their effectiveness in managing insect bites or stings. Some antihistamines cause sedation, which may help at night. Reassess children with an insect bite or sting if: • symptoms or signs of an infection develop. • their condition worsens rapidly or significantly, or they become systemically unwell. • severe pain out of proportion to the wound is experienced, which may indicate the presence of toxin producing bacteria.	
For insect bite or sting with symptoms or signs of infection	Manage as Cellulitis or Erysipelas, as appropriate. See next section of these guidelines[2] Consider referral or seeking specialist advice if patient is showing symptoms and signs of infection and: • is systemically unwell. • is severely immunocompromised, and have symptoms or signs of an infection. • previously had a systemic allergic reaction to the same type of bite or sting. • bite or sting was in the mouth or throat, or around the eyes. • bite or sting was by an unusual or exotic insect. • has fever or persisting lesions associated with a bite or sting that occurred while travelling outside the UK.	

Notes

1. NICE Guideline NG182: Insect bites and stings: antimicrobial prescribing. September 2020. https://www.nice.org.uk/guidance/ng182

2. See next section of these guidelines. Based on recommendations from NICE Guideline NG141: Cellulitis and erysipelas: antimicrobial prescribing September 2019. https://www.nice.org.uk/guidance/ng141.

Cellulitis and Erysipelas[1]	First Line Choices[2]	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
If child is under 1 month old	Refer to paediatric specialist	
Infection not near the eyes or nose[4]	**Flucloxacillin**[2,3] oral/IV DO NOT use in penicillin allergic patients **Clarithromycin**[5,6] oral/IV **DURATION**[7,8]**: 5-7 days**	**Co-amoxiclav**[2] oral/IV DO NOT use in penicillin allergic patients **Cefuroxime** IV CAUTION in penicillin allergic patients **Clindamycin**[2] oral/IV **DURATION**[7,8]**: 5-7 days**
Infection near the eyes or nose Consider seeking specialist advice[4]	**Co-amoxiclav**[2] oral/IV DO NOT use in penicillin allergic patients **Clarithromycin**[2,5,6] oral/IV **and**	**Cefuroxime** IV **and Metronidazole**[2] IV CAUTION in penicillin allergic patients

Cellulitis and Erysipelas[1]	First Line Choices[2]	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
	Metronidazole[2] oral/IV **DURATION[8]: 7 days**	For severely penicillin allergic patients, discuss choices with Consultant Microbiologist on-call **DURATION[8]: Review IV to oral at 48 to 72 hours, complete 7 days**
IF (suspected or confirmed) MRSA infection Manage with dual therapy with the IV antibiotic chosen from the options above	**Vancomycin** IV	**Teicoplanin** IV

Notes

1. NICE Guideline NG141: Cellulitis and erysipelas: antimicrobial prescribing September 2019. https://www.nice.org.uk/guidance/ng141
2. Give oral antibiotics first line if the person can take oral medicines. If severe, treat with intravenous antibiotics. Review IV to oral at 48 to 72 hours.
3. If flucloxacillin oral solution is not tolerated because of poor palatability, consider capsules or the alternative options given.
4. Infection around the eyes or the nose (the triangle from the bridge of the nose to the corners of the mouth, or immediately around the eyes including periorbital cellulitis) is of more concern because of risk of a serious intracranial infection.
5. IV formulation for Clarithromycin is available, but not recommended if oral route is available.
6. Erythromycin is preferred in young women who are pregnant.
7. Stop antibiotic treatment after 5 days unless microbiological results suggest a longer course length is needed or the person is not clinically stable.
8. A longer course (up to 14 days in total) may be needed based on clinical assessment. However, skin does take some time to return to normal, and full resolution of symptoms at 5 to 7 days is not expected.

Scalded Skin Syndrome[1]	First Line Choice	Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective
Usually Staphylococcal Require intravenous antibiotic therapy and supportive care.	**Flucloxacillin**[2,3] IV DO NOT use in penicillin allergic patients **DURATION[6]: 5 days**	**Clarithromycin**[2,4,5] IV **DURATION[6]: 5 days**
IF (suspected or confirmed) MRSA infection	Discuss with Consultant Microbiologist	

Notes

1. UpToDate: Staphylococcal scalded skin syndrome. June 2019.

   https://www.uptodate.com/contents/staphylococcal-scalded-skin-syndrome
2. Review IV to oral at 48 to 72 hours.
3. If flucloxacillin oral solution is not tolerated because of poor palatability, consider capsules or the alternative options given.
4. IV formulation for Clarithromycin is available, but not recommended if oral route is available.
5. Erythromycin is preferred in young women who are pregnant.
6. A longer course (up to 14 days in total) may be needed based on clinical assessment. However, skin does take some time to return to normal, and full resolution of symptoms at 5 to 7 days is not expected. When adequately treated, most patients recover fully within two to three weeks without significant scarring, disfigurement, or other long-term sequelae.

Paronychia[1]	**First Line Choices**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
For minor, localised infection	Advise the person to apply moist heat (warm soaks) three to four times a day to alleviate pain, localize the infection, and hasten draining of the pus ('bring to a head'). **Fusidic acid 2% cream**[2] topical. Apply to the affected area three to four times a day **DURATION: 7 days**	
For cases where **any** of the following apply: - Topical management not appropriate - Incision and drainage required - Complicating factors – cellulitis, fever, diabetic or immunocompromised patient	**Flucloxacillin**[3] oral DO NOT use in penicillin allergic patients **DURATION**[5,6]**: 7 days**	**Clarithromycin**[4] oral/IV **DURATION**[5,6]**: 7 days**

Notes

1. NICE Clinical knowledge summary: Paronychia - acute. May 2017 https://cks.nice.org.uk/paronychia-acute
2. Do not use for more than 7 days as risk of resistance increases
3. If known or suspected MRSA, please contact Consultant Microbiologist on-call for advice
4. Erythromycin is preferred in young women who are pregnant.
5. Swab the contents of a paronychia if not responded to treatment by day 3, or is recurrent, enlarging, inflammation of surrounding tissue, patient systemically unwell, doubt about the diagnosis, immunosuppressed or diabetic patient. Review in line with culture and sensitivities.
6. If response is slow after 7 days of antibiotics, continue for a further 7 days.

Surgical site infection[1]	**First Line Choices**[2]	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Wound swabs should be sent off for culture and sensitivity testing to guide next steps.	**Flucloxacillin**[3] oral/IV DO NOT use in penicillin allergic patients **DURATION**[4]**: Review at 48-72 hours**	**Clindamycin**[3] oral/IV **DURATION**[4]**: Review at 48-72 hours**

Notes

1. NICE Guideline NG125: Surgical site infections: prevention and treatment: April 2019 https://www.nice.org.uk/guidance/ng125
2. For known or suspected MRSA infection discuss with Consultant Microbiologist
3. Route to be determined by severity and extent of infection (deep seated should require initiation with IV), otherwise oral antibiotics are preferred if appropriate.
4. Duration to be determined by plan for corrective action. Review at 48-72 hours.

Human and animal bites[1,2]	First Line Choices[1,2]	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
Human bites[3,4]	**Co-amoxiclav**[5] oral/IV DO NOT use in penicillin allergic patients **DURATION: 7 days**	**Clarithromycin**[5,6,7] oral/IV **and Metronidazole**[5,7] oral/IV **DURATION**[7]**: 7 days**
Animal bites[8,9]	**Co-amoxiclav**[2,4] oral/IV DO NOT use in penicillin allergic patients **DURATION: 7 days**	**Doxycycline**[7,10] oral **and Metronidazole**[5,7] oral/IV DO NOT use in children <12years old **DURATION**[7]**: 7 days**

Notes

1. NICE Clinical knowledge summary: Bites – human and animal. October 2018. https://cks.nice.org.uk/bites-human-and-animal
2. PHE/NICE: Managing common infections: guidance for primary care. February 2019. https://www.gov.uk/government/publications/managing-common-infections-guidance-for-primary-care
3. Prescribe prophylactic oral antibiotics for all human bite wounds under 72 hours old, even if there is no sign of infection.
4. Thorough irrigation is very important, and antibiotic prophylaxis is advised. Assess risk of blood-borne viral infection and risk of tetanus.
5. Give oral antibiotics first line if the person can take oral medicines. If severe, treat with intravenous antibiotics.
6. Erythromycin is preferred in young women who are pregnant.
7. Penicillin allergy options: review at 24 hours AND at 48 hours as not all pathogens are covered.
8. Cat bite - always give prophylaxis
9. Dog bite - give prophylaxis if puncture wound; bite to hand, foot, face, joint, tendon, or ligament. Also prophylaxis necessary for immunocompromised and asplenic patients.
10. Doxycycline is contraindicated in children under 12 years and in pregnancy. Seek specialist input.

Necrotising fasciitis[1,2]	First Line Choices[3,4]	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective[4]
Urgent surgical debridement and discussion with Consultant Microbiologist mandatory	**Meropenem** IV **and clindamycin** IV CAUTION in penicillin allergic patients **DURATION**[7]**: Review at 5 days since last surgery**	For severely penicillin allergic patients **Teicoplanin** IV (6mg/kg Actual Body Weight) **and clindamycin**[4] IV **and gentamicin**[5,6] IV may be initiated pending urgent microbiologist input **DURATION**[7]**: Review at 5 days since last surgery**

Notes

1. UpToDate: Necrotizing soft tissue infections. May 2020. https://www.uptodate.com/contents/necrotizing-soft-tissue-infections
2. IDSA Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections. June 2014. https://pubmed.ncbi.nlm.nih.gov/24947530/
3. If require MRSA cover, please discuss urgently with Consultant Microbiologist on-call
4. Use the maximum available intravenous dose adjusted for weight.
5. Gentamicin should be continued for a maximum of 5 days unless advised otherwise by Microbiology.
6. Specific information on gentamicin drug dosing and monitoring is given in Section 3.6.4 of this guideline.
7. Review antibiotic treatment 5 days after the last surgical debridement and plan to stop treatment if improved clinically and no further surgery planned.

4.5 Meningitis and meningococcal disease

- Empirical treatment initiation
- Specific treatment targeted by organism

EMPIRICAL TREATMENT for suspected or confirmed bacterial meningitis[1,3]	First Line Choices[1]	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective[1]
Under 3 months	**Cefotaxime**[4] IV **and Amoxicillin** IV DO NOT use in penicillin allergic patients If herpes simplex encephalitis suspected **add aciclovir** IV If recent travel outside UK, or prolonged or multiple exposure to antibiotics (within past 3 months) **add Vancomycin** IV **DURATION: See next table**	**Ceftriaxone** iv (see note 4) **+/- Amoxicillin** IV DO NOT use Amoxicillin in penicillin allergic patients CAUTION with ceftriaxone in penicillin allergic patients If known or suspected severe beta-lactam allergy, discuss with Consultant Microbiologist urgently **DURATION: See next table**
Over 3 months	**Ceftriaxone**[4] IV CAUTION in penicillin allergic patients If herpes simplex encephalitis suspected **add aciclovir** IV If recent travel outside UK, or prolonged or multiple exposure to antibiotics (within past 3 months) **add Vancomycin** IV **DURATION: See next table**	If there is a well-documented history of an anaphylactic reaction with a beta lactam antibiotic consider **Chloramphenicol** IV empirically but urgent discussion is required with microbiology due to toxicity concerns in infants. **DURATION: See next table**

Notes

1. NICE Clinical Guideline CG102: Meningitis (bacterial) and meningococcal septicaemia in under 16s: recognition, diagnosis and management. February 2015. https://www.nice.org.uk/guidance/CG102/chapter/1-Guidance#management-in-secondary-care

2. Non-specific presentation causes difficulties in distinguishing from other less important (viral) infections. Specific (or classic) presentations more likely to have bacterial meningitis or meningococcal septicaemia. Presentation severity and specificity increases over time.

3. NICE Guideline NG143: Fever in under 5s: assessment and initial management. November 2019. https://www.nice.org.uk/guidance/ng143

4. Ceftriaxone is not suitable for premature babies, babies with jaundice, hypoalbuminaemia or acidosis as it may exacerbate hyperbilirubinaemia. Also, do not use if calcium-containing infusions are being administered. Use cefotaxime instead.

SPECIFIC TREATMENT for suspected or confirmed bacterial meningitis[1]	First Line Choices – seek Consultant microbiologist advice if alternative options required (i.e., severe penicillin allergy)
H. influenzae (and other gram negative bacilli)	Under 3 months old: **cefotaxime**[2] IV for **at least 21 days**[4] CAUTION in penicillin allergic patients Over 3 months old: **ceftriaxone**[2,3] IV for **10 days in total** CAUTION in penicillin allergic patients
S. pneumoniae (this will also cover Group B Streptococci)	Under 3 months old: **Cefotaxime**[3] IV for **at least 14 days**[4] CAUTION in penicillin allergic patients Over 3 months old: **ceftriaxone**[2,3] IV for **14 days in total** CAUTION in penicillin allergic patients
L. monocytogenes	**Amoxicillin** IV for **21 days in total** **and gentamicin**[5] IV for **at least the first 7 days** DO NOT use in penicillin allergic patients
Meningococcal disease *(N. meningitidis)*	In confirmed meningococcal disease: **Ceftriaxone**[2] IV for **7 days in total**. *Also see note 3, but discuss with microbiology if ceftriaxone is unsuitable* CAUTION in penicillin allergic patients In unconfirmed but clinically suspected meningococcal disease: **Ceftriaxone** IV for **7 days in total**. *Also see note 3, but discuss with microbiology if ceftriaxone is unsuitable* CAUTION in penicillin allergic patients
Unconfirmed, uncomplicated, but clinically suspected bacterial meningitis	Under 3 months old: **Cefotaxime** IV **and amoxicillin** IV for **at least 14 days**[4] DO NOT use amoxicillin in penicillin allergic patients CAUTION with cefotaxime in penicillin allergic patients Over 3 months old: **Ceftriaxone**[3] IV for **at least 10 days**[4] CAUTION in penicillin allergic patients

Notes

1. NICE Clinical Guideline CG102: Meningitis (bacterial) and meningococcal septicaemia in under 16s: recognition, diagnosis and management. February 2015. https://www.nice.org.uk/guidance/CG102/chapter/1-Guidance#management-in-secondary-care

2. Unless directed otherwise by the results of antibiotic sensitivities.

3. Ceftriaxone is not suitable for premature babies, babies with jaundice, hypoalbuminaemia or acidosis as it may exacerbate hyperbilirubinaemia. Also, do not use if calcium-containing infusions are being administered. Use cefotaxime instead.

4. If the clinical course is complicated consider extending the duration of treatment after discussing with consultant Microbiologist.

5. Specific information on gentamicin drug dosing and monitoring is given in Section 3.6.4 of this guideline.

4.6 Gastrointestinal Infection

- Gastroenteritis
- *Campylobacter*
- *E. Coli 0157*
- *Salmonella* (non-typhoid species)
- Typhoid
- Shigella dysentery
- Amoebic dysentery
- *Giardia*
- *C. difficile*
- Peritonitis (surgical abdomen)
- *H. pylori*

Gastroenteritis[1,2,3]	**First Line Choices**	**Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective**
Do not routinely treat with antibiotic. Usual duration of diarrhoea is 5–7 days and in most children it stops within 2 weeks Usual duration of vomiting is 1- 2 days and in most children it stops within 3 days Seek specialist advice if the symptoms do not resolve within these timeframes	Majority of the cases are self-limiting and require NO antibiotic therapy. Suggest rehydration and electrolyte replacement. However, give antibiotic treatment to all children if: • suspected or confirmed septicaemia • extra-intestinal spread of bacterial infection • younger than 6 months old with salmonella gastroenteritis • malnourished or immunocompromised with salmonella gastroenteritis • Clostridium difficile-associated pseudomembranous enterocolitis, giardiasis, dysenteric shigellosis, dysenteric amoebiasis or cholera (see specific indications further down). For children who have recently been abroad, seek specialist advice about antibiotic therapy.	

Notes

1. NICE Clinical Guideline CG84: Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management. April 2009 https://www.nice.org.uk/guidance/CG84
2. NICE Clinical knowledge summary: Gastroenteritis. March 2019. https://cks.nice.org.uk/gastroenteritis
3. BNFc: Gastro-intestinal system infections, antibacterial therapy. https://bnfc.nice.org.uk/treatment-summary/gastro-intestinal-system-infections-antibacterial-therapy.html

Campylobacter[1]	**First Line Choice[1]**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
Usually self-limiting	Treatment is indicated only if immunocompromised or in severe infections.	
	Clarithromycin[2] oral **DURATION[6]: 5 days**	**Ciprofloxacin[3,4,5]** oral **DURATION[6]: 5 days**

Notes:

1. BNFc: Gastro-intestinal system infections, antibacterial therapy. https://bnfc.nice.org.uk/treatment-summary/gastro-intestinal-system-infections-antibacterial-therapy.html
2. Erythromycin is preferred in young women who are pregnant. Azithromycin may be preferred where compliance is a concern, as a shorter course duration can be used.
3. Strains with decreased sensitivity to ciprofloxacin are isolated frequently, hence not first line.

4. Quinolones cause arthropathy in the weight-bearing joints of immature animals and are therefore generally not recommended in children and growing adolescents. However, the significance of this effect in humans is uncertain and in some specific circumstances use of ciprofloxacin may be justified in children. https://bnf.nice.org.uk/drug/ciprofloxacin.html#importantSafetyInformations
5. See MHRA advice for restrictions and precautions for using fluoroquinolone antibiotics due to very rare reports of disabling and potentially long-lasting or irreversible side effects affecting musculoskeletal and nervous systems. Warnings include: stopping treatment at first signs of a serious adverse reaction (such as tendonitis, seizures), and prescribing with special caution, and avoiding coadministration with a corticosteroid. March 2019.
6. BMJ Best Practice: Campylobacter infection. September 2018. https://bestpractice.bmj.com/topics/en-gb/1175/pdf/1175/Campylobacter%20infection.pdf

***E.coli* 0157**[1,2,3]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
Usually self-limiting and symptoms will clear within 2 weeks.	Majority of the cases are self-limiting and require NO antibiotic therapy. Suggest rehydration and electrolyte replacement. In children with Shiga toxin-producing Escherichia coli (STEC) infection, seek specialist advice on monitoring for haemolytic uraemic syndrome. Seek specialist advice if the symptoms do not resolve within these timeframes	

Notes:
1. NICE Clinical Guideline CG84: Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management. April 2009 https://www.nice.org.uk/guidance/CG84
2. BNFc: Gastro-intestinal system infections, antibacterial therapy. https://bnfc.nice.org.uk/treatment-summary/gastro-intestinal-system-infections-antibacterial-therapy.html
3. E. Coli VTEC O157. Authored by Dr Colin Tidy. Last edited March 2018. https://patient.info/digestive-health/diarrhoea/e-coli-vtec-o157#nav-6

***Salmonella* (non-typhoid species)**[1]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
For non-typhoid strains of Salmonella, treatment is indicated only in (or for patients at risk of) severe or invasive infections, or in children under 6 months of age. Note: Treatment is indicated for all cases of *Salmonella typhi* (see Typhoid, below)	**Cefotaxime**[2] IV initially CAUTION in penicillin allergic patients Then switch to **Azithromycin**[2] oral when clinically improved **DURATION: 7 days**	**Ciprofloxacin**[3,4,5] IV initially then switch to oral when clinically improved and able to absorb oral medication. **DURATION: 7 days**

Notes:
1. NICE Clinical Guideline CG84: Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management. April 2009 https://www.nice.org.uk/guidance/CG84
2. BNFc: Gastro-intestinal system infections, antibacterial therapy. https://bnfc.nice.org.uk/treatment-summary/gastro-intestinal-system-infections-antibacterial-therapy.html
3. Quinolones cause arthropathy in the weight-bearing joints of immature animals and are therefore generally not recommended in children and growing adolescents. However, the significance of this effect in humans is uncertain and in some specific circumstances use of ciprofloxacin may be justified in children. https://bnf.nice.org.uk/drug/ciprofloxacin.html#importantSafetyInformations

4. See MHRA advice for restrictions and precautions for using fluoroquinolone antibiotics due to very rare reports of disabling and potentially long-lasting or irreversible side effects affecting musculoskeletal and nervous systems. Warnings include: stopping treatment at first signs of a serious adverse reaction (such as tendonitis, seizures), and prescribing with special caution, and avoiding coadministration with a corticosteroid (March 2019).
5. Ciprofloxacin has very good oral bioavailability, so can be used as soon as oral absorption of medication is felt to be reliable.

Typhoid[1,2,3]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
Hospital admission required for severe symptoms of typhoid fever, such as persistent vomiting, severe diarrhoea or a swollen stomach. Antibiotics should be administered intravenously to start with. Check travel history. Infections from Middle-East, South Asia, and South-East Asia may be multiple-antibacterial-resistant and sensitivity should be tested.	**Cefotaxime**[2] IV initially CAUTION in penicillin allergic patients **Ceftriaxone**[2,5] IV initially CAUTION in penicillin allergic patients then switch to **Azithromycin**[2] oral when clinically improved **DURATION**[3]**: 7-14 days**	**Ciprofloxacin**[2,6,7] IV initially then switch to oral when clinically improved and able to absorb oral medication. Check if micro-organism sensitive **Azithromycin**[2] oral may be an alternative in mild or moderate disease caused by multiple-antibacterial-resistant micro-organisms. **DURATION**[3]**: 7-14 days**

Notes:

1. NICE Clinical Guideline CG84: Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management. April 2009 https://www.nice.org.uk/guidance/CG84
2. BNFc: Gastro-intestinal system infections, antibacterial therapy. https://bnfc.nice.org.uk/treatment-summary/gastro-intestinal-system-infections-antibacterial-therapy.html
3. NHS Overview Patient Leaflet: Typhoid Fever June 2018 https://www.nhs.uk/conditions/typhoid-fever/
4. Improvement usually noted within 3 to 5 days, but recovery period continues after antibiotic course completed.
5. Ceftriaxone is not suitable for premature babies, babies with jaundice, hypoalbuminaemia or acidosis as it may exacerbate hyperbilirubinaemia. Also, do not use if calcium-containing infusions are being administered. Use cefotaxime instead.
6. Quinolones cause arthropathy in the weight-bearing joints of immature animals and are therefore generally not recommended in children and growing adolescents. However, the significance of this effect in humans is uncertain and in some specific circumstances use of ciprofloxacin may be justified in children. https://bnf.nice.org.uk/drug/ciprofloxacin.html#importantSafetyInformations
7. See MHRA advice for restrictions and precautions for using fluoroquinolone antibiotics due to very rare reports of disabling and potentially long-lasting or irreversible side effects affecting musculoskeletal and nervous systems. Warnings include: stopping treatment at first signs of a serious adverse reaction (such as tendonitis, seizures), and prescribing with special caution, and avoiding coadministration with a corticosteroid (March 2019).

Shigella dysentery[1,2]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
Give antibiotic treatment to all children presenting with dysenteric shigellosis.	**Azithromycin**[2] oral **DURATION**[6,7]**: 3 days**	**Ciprofloxacin**[2,4,5] oral **Trimethoprim**[2] oral (if sensitive) **DURATION**[6,7]**: 3 days**

Notes:

1. NICE Clinical Guideline CG84: Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management. April 2009 https://www.nice.org.uk/guidance/CG84
2. BNFc: Gastro-intestinal system infections, antibacterial therapy. https://bnfc.nice.org.uk/treatment-summary/gastro-intestinal-system-infections-antibacterial-therapy.html
3. NHS Overview Patient Leaflet: Dysentry January 2020.https://www.nhs.uk/conditions/dysentery/
4. Quinolones cause arthropathy in the weight-bearing joints of immature animals and are therefore generally not recommended in children and growing adolescents. However, the significance of this effect in humans is uncertain and in some specific circumstances use of ciprofloxacin may be justified in children. https://bnf.nice.org.uk/drug/ciprofloxacin.html#importantSafetyInformations
5. See MHRA advice for restrictions and precautions for using fluoroquinolone antibiotics due to very rare reports of disabling and potentially long-lasting or irreversible side effects affecting musculoskeletal and nervous systems. Warnings include: stopping treatment at first signs of a serious adverse reaction (such as tendonitis, seizures), and prescribing with special caution, and avoiding coadministration with a corticosteroid (March 2019).
6. UpToDate: Shigella infection: Treatment and prevention in adults. June 2019. https://www.uptodate.com/contents/shigella-infection-treatment-and-prevention-in-adults#H2223623723
7. Longer course may be required in severe cases with up to 14 days in rare event of bacteraemia.

Amoebic dysentery[1,2]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
Give antibiotic treatment to all children presenting with dysenteric amoebiasis.	**Metronidazole**[3,4] oral for 5 days[5] **DURATION**[5]**: 5 days** Followed by a 10 day course of Diloxanide furoate[7]	**Tinidazole**[6] oral for 3 days **DURATION: 3 days** Followed by a 10 day course of Diloxanide furoate[7]

Notes:

1. NICE Clinical Guideline CG84: Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management. April 2009 https://www.nice.org.uk/guidance/CG84
2. NHS Overview Patient Leaflet: Dysentry January 2020 https://www.nhs.uk/conditions/dysentery/
3. BNFc: Metronidazole https://bnfc.nice.org.uk/drug/metronidazole.html
4. Five days recommended for intestinal infection, but may need to extend duration to 10 days in extra-intestinal infection. https://bnfc.nice.org.uk/drug/metronidazole.html
5. Note: Metronidazole tablets provide the active drug. The tablets may be crushed and dispersed (unlicenced) for administration via mouth or feeding tube if applicable. Metronidazole liquid suspension contains a prodrug of metronidazole needing activation by gastric enzymes. This may render it less effective in situations of rapid gut transit.
6. BNFc: Tinidazole https://bnfc.nice.org.uk/drug/tinidazole.html
7. Diloxanide furoate is not effective against hepatic amoebiasis, but a 10-day course should be given at the completion of metronidazole or tinidazole treatment to destroy any amoebae in the gut https://bnfc.nice.org.uk/treatment-summary/antiprotozoal-drugs.html

Giardia[1,2]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
Give antibiotic treatment to all children presenting with giardiasis. Usually resolves by 7-10 days with the right treatment.	**Metronidazole**[3,4] oral **DURATION: 3 days**	**Tinidazole**[5] oral **DURATION: Single dose**[6]

Notes:

1. NICE Clinical Guideline CG84: Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management. April 2009 https://www.nice.org.uk/guidance/CG84
2. NHS Overview Patient Leaflet: Giardiasis October 2017 https://www.nhs.uk/conditions/giardiasis/
3. BNFc: Metronidazole https://bnfc.nice.org.uk/drug/metronidazole.html
4. Note: Metronidazole tablets provide the active drug. The tablets may be crushed and dispersed (unlicenced) for administration via mouth or feeding tube if applicable. Metronidazole liquid suspension contains a prodrug of metronidazole needing activation by gastric enzymes. This may render it less effective in situations of rapid gut transit.
5. BNFc: Tinidazole https://bnfc.nice.org.uk/drug/tinidazole.html
6. BNFc suggests that dose may be repeated once if necessary.

Clostridium difficile[1,2]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
Give antibiotic treatment to ALL children presenting with Clostridium difficile-associated diarrhoea. Children under 2 years old MUST also be discussed with a consultant microbiologist.	**Metronidazole**[3,4,5,6] oral/IV **DURATION: Review at day 3 for improvement. Complete 10-14 days if responding.**	**Vancomycin**[6] oral (If severe initial presentation, or recurrent case, or not responding to metronidazole). **DURATION**[7]**: Review at day 3 for improvement. Complete 10-14 days if responding.**

Notes:

1. NICE Clinical Guideline CG84: Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management. April 2009 https://www.nice.org.uk/guidance/CG84
2. BNFc: Gastro-intestinal system infections, antibacterial therapy. https://bnfc.nice.org.uk/treatment-summary/gastro-intestinal-system-infections-antibacterial-therapy.html
3. BNFc: Metronidazole https://bnfc.nice.org.uk/drug/metronidazole.html
4. Note: Metronidazole tablets provide the active drug. The tablets may be crushed and dispersed (unlicenced) for administration via mouth or feeding tube if applicable. Metronidazole liquid suspension contains a prodrug of metronidazole needing activation by gastric enzymes. This may render it less effective in situations of rapid gut transit. Please see Section 6.1 of these guidelines.
5. Metronidazole can be given by intravenous infusion if oral treatment is inappropriate. Oral treatment is preferred where possible as direct contact with the infection in the inner lumen of the gut.
6. Oral Vancomycin may be preferred as first line for very sick patients. Oral capsules are available from pharmacy, and the IV formulation can be reconstituted and used for oral administration (see Section 6.2 of these guidelines). Do not administer IV as this is ineffective due to vancomycin being unable to pass through the gut wall. Hence, Vancomycin blood level monitoring is not required for oral use https://bnfc.nice.org.uk/drug/vancomycin.html
7. If insufficient response to Vancomycin oral, or there is complex history of recurrence that has been treated with Vancomycin previously, please seek input from a consultant Microbiologist and the antimicrobial pharmacists.

Peritonitis (surgical abdomen) [1,2]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
For peritonitis associated with peritoneal dialysis, please seek further advice from Consultant Microbiologist on-call[2]	**Co-amoxiclav** IV **and Metronidazole** IV DO NOT use in penicillin allergic patients Consider adding a single dose of **Gentamicin**[4] IV if slow response If known to be MRSA positive **add Vancomycin** IV **DURATION: Review at 48-72 hours for improvement and consider oral switch. Complete 5-10 days in total, if responding, depending on severity of initial presentation.**	**Cefuroxime**[3] IV **and Metronidazole** IV CAUTION in penicillin allergic patients **Vancomycin** IV **and Metronidazole** IV **and Gentamicin**[4] IV **DURATION: Review at 48-72 hours for improvement and consider oral switch. Complete 5-10 days in total, if responding, depending on severity of initial presentation.**
Notes: 1. NICE Clinical Guideline CG84: Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management. April 2009 https://www.nice.org.uk/guidance/CG84 2. BNFc: Gastro-intestinal system infections, antibacterial therapy. https://bnfc.nice.org.uk/treatment-summary/gastro-intestinal-system-infections-antibacterial-therapy.html 3. Can use in mild penicillin allergy, not advised in severe unless patient has tolerated a beta-lactam containing antibiotic previously 4. Specific information on gentamicin drug dosing and monitoring is given in Section 3.6.4 of this guideline		

Helicobacter pylori[1]	**First Line Choice**[2]	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
	Amoxicillin oral **and Clarithromycin** oral **and an anti-secretory agent**[3] oral DO NOT use in penicillin allergic patients **DURATION**[4]**: 7 days**	**Amoxicillin** oral **and Metronidazole** oral **and an anti-secretory agent**[3] oral (if recurrent) DO NOT use in penicillin allergic patients **Clarithromycin** oral **and Metronidazole** oral **and an anti-secretory agent**[3] oral **DURATION**[4,5]**: 7 days**
Notes: 1. BNFc: Peptic ulceration. https://bnfc.nice.org.uk/treatment-summary/peptic-ulceration.html 2. Two-week dual-therapy regimens using a proton pump inhibitor and a single antibacterial produce low rates of *H. pylori* eradication and are not recommended. 3. Using an appropriate proton pump inhibitor or H2-receptor antagonist 4. There is usually no need to continue anti-secretory treatment (with a proton pump inhibitor or H2-receptor antagonist); however, if the ulcer is large, or complicated by haemorrhage or perforation then anti-secretory treatment is continued for a further 3 weeks. 5. Two-week triple-therapy regimens offer the possibility of higher eradication rates compared to one-week regimens, but adverse effects are common and poor compliance is likely to offset any possible gain.		

4.7 Genital Tract

Sexually transmitted disease: for post-exposure prophylaxis see intranet guideline, for suspected or confirmed infection seek advice from Sexual Health

4.8 Sepsis of unknown origin

Sepsis of unknown origin[1,2]	First Line Choices – seek Consultant microbiologist advice if alternative options required (i.e., severe penicillin allergy)[3,6]
Under 3 months old	**Cefotaxime** IV **and** **Amoxicillin** IV **and** **Gentamicin**[4] IV DO NOT use amoxicillin in penicillin allergic patients CAUTION with cefotaxime in penicillin allergic patients
3 months to 5 years old	**Ceftriaxone**[5] IV **and** **Gentamicin**[4,7] IV CAUTION with ceftriaxone in penicillin allergic patients
Above 5 years old	**Ceftriaxone**[5] IV **and** **Gentamicin**[4,7] IV CAUTION with ceftriaxone in penicillin allergic patients
Febrile Neutropenia (oncology/haematology)	**Piperacillin/tazobactam** IV **and** **Gentamicin**[4,8] IV stat dose DO NOT use piperacillin/tazobactam in penicillin allergic patients If fungal infection suspected/high risk add **Fluconazole** oral If line infection suspected, mucositis or previous MRSA add **Teicoplanin**[3] IV
Regular review is required to understand source, focus antimicrobial choices and guide treatment duration. If source remains unknown, please discuss on individual case basis with Consultant Microbiologist on call.	

Notes:

1. NICE Guideline NG51: Sepsis: recognition, diagnosis and early management: September 2017 https://www.nice.org.uk/guidance/NG51
2. The UK Sepsis Trust: Inpatient Paediatrics screening and action tools www.sepsistrust.org
3. For known or suspected MRSA septicaemia discuss with Consultant Microbiologist on call
4. Gentamicin regular dosing will needs adjusting in patients under the care of haematology/oncology, those on nephrotoxics, and those with renal impairment. Please refer to section 3.6.4 for more detailed advice and for guidance on monitoring.
5. Maximum daily dose of Ceftriaxone is 4g. Twice daily (12 hourly) administration may be considered where doses greater than 2g are administered
6. For suspected infective endocarditis seek advice from regional paediatric cardiology unit
7. Ceftriaxone monotherapy is a suitable alternative in children older than 3 months with community onset infection and low risk of infection with multiresistant Gram negative bacteria. See Weiss et al. “Surviving sepsis campaign international guidelines for the management of septic shock and sepsis-associated organ dysfunction in children.” *Intensive Care Med* (2020)
8. Consider continuation of gentamicin in febrile neutropenia, with regular dosing advice as per section 3.6.4., based on gentamicin level monitoring.

4.9 Eye

Conjunctivitis[1,2]	First Line Choices	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
Use topical antibiotics if not self-resolved after 3 days, or if severe, as most cases are viral or self-limiting. Symptoms may be eased with self-care measures such as bathing/cleaning the eyelids with cotton wool soaked in sterile saline or boiled and cooled water to remove any discharge	**Chloramphenicol 0.5% eye drops[3,4]:** Apply 1 drop every 2 hours for 2 days, then one drop four times a day for 5 days[5]. **Chloramphenicol 1% eye ointment[3,4]:** Apply four times a day for 2 days, then twice a day for 5 days[5].	**Fusidic acid 1% eye drops:** Apply one drop twice a day for 7 days
Notes 1. NICE Clinical knowledge summary: Conjunctivitis – infective. April 2018 https://cks.nice.org.uk/conjunctivitis-infective 2. PHE/NICE: Managing common infections: guidance for primary care. February 2019 https://www.gov.uk/government/publications/managing-common-infections-guidance-for-primary-care 3. Do not prescribe topical chloramphenicol to people who are pregnant or breastfeeding, hypersensitivity to the active substance or to any of the excipients, had myelosuppresssion during previous exposure to chloramphenicol, have personal or family history of blood dyscrasias including aplastic anaemia. 4. Any systemic absorption of chloramphenicol will be very small and hence not considered a risk. This can be further reduced by only using one drop, rather than flooding with several, and also by holding the tear duct down for at least a minute to minimise naso-lacrimal drainage. Alternatively, use eye ointment as there is less opportunity for nasal drainage. https://bnf.nice.org.uk/treatment-summary/eye.html 5. Topical chloramphenicol should be not be used on a prolonged basis.		

Blepharitis[1,2]	First Line Choices	Alternatives where first line choices contraindicated (e.g. allergy), not tolerated or not effective
Use of antibiotics as chronic intermittent condition requiring ongoing hygiene measures[1] Consider topical antibiotics if anterior blepharitis not responding to self-care measures. Consider oral antibiotics if posterior blepharitis associated with meibomian gland dysfunction and rosacea not responding to self-care measures.	**Chloramphenicol 1% eye ointment:** Apply twice daily - to be rubbed into the lid margin. **DURATION[2,3]: Up to 6 weeks** based on severity of the blepharitis and response[1], but may be required for up to 6 weeks[2,3].	**Oxytetracycline[2,4,5]** oral DO NOT use in children <12years old **Doxycycline[2,4,5]** oral DO NOT use in children <12years old Unlicenced (off-label) use NB: Useful where compliance with twice daily dosing is an issue but increased risk of photosensitivity reactions. **Erythromycin [2,4]** oral Unlicenced (off-label) use NB: Where tetracyclines are not suitable[5] **DURATION[2,3]: Review at 4 weeks** may extend to 12 weeks with dose adjustment if showing reasonable response.

Notes

1. NICE Clinical knowledge summary: Blepharitis. April 2019 https://cks.nice.org.uk/blepharitis
2. PHE/NICE: Managing common infections: guidance for primary care. February 2019 https://www.gov.uk/government/publications/managing-common-infections-guidance-for-primary-care
3. NICE Blepharitis reference also directs the prescriber to NICE Clinical knowledge summary: Conjunctivitis – infective. April 2018 https://cks.nice.org.uk/conjunctivitis-infective, which advises that prolonged use of topical chloramphenicol should be avoided unless necessary.
4. NICE Blepharitis reference also directs the prescriber to NICE Clinical knowledge summary: Rosacea- Acne. October 2018 https://cks.nice.org.uk/rosacea-acne which advises the oral options
5. Tetracyclines are contraindicated in children under 12 years and in pregnancy.

Orbital cellulitis[1,2]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
Seek urgent ophthalmology and ENT review	If child is less than three months old **Cefotaxime** IV **+/- Metronidazole[2]** IV CAUTION in penicillin allergic patients If child is more than three months old **Ceftriaxone[3]** IV **+/- Metronidazole[2]** IV CAUTION in penicillin allergic patients (Switch to Co-amoxiclav oral once stable) **DURATION: 14-21 days.** If bone involvement, may need up to 6 weeks.	In patients with penicillin anaphylaxis **Ciprofloxacin[4]** IV **and Clindamycin[5]** IV may be initiated pending urgent microbiologist input. **DURATION: 14-21 days.** If bone involvement, may need up to 6 weeks.

Notes

1. BMJ Best Practice: Pero-orbital and orbital cellulitis. March 2018 https://bestpractice.bmj.com/topics/en-gb/734
2. Orbital Cellulitis Management Guideline for Adults and Paeds. Date not specified therefore potentially superceeded. https://www.entuk.org/sites/default/files/files/ENT%20UK%20Revised%20Orbital%20Cellulitis%20Flow%20Chart%202017.pdf
3. Consider adding metronidazole if possibility of intracranial involvement or if orbital cellulitis is associated with chronic sinusitis or an odontogenic source.
4. Ceftriaxone is not suitable for premature babies, babies with jaundice, hypoalbuminaemia or acidosis as it may exacerbate hyperbilirubinaemia. Also, do not use if calcium-containing infusions are being administered. Use cefotaxime instead.
5. Where other options are not feasible, risk benefit analysis is in favour of using a short course of Ciprofloxacin, limiting duration to reduce risk of side effects. Please seek advice from Consultant microbiologist, to include duration and IV to oral switch options.
6. Clindamycin alone for orbital cellulitis may not be sufficient. It won't cover Haemophilus- commonly implicated as an etiological agent, and with orbital cellulitis being a serious condition, broader spectrum cover is important.

Peri-orbital cellulitis[1]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
The majority of paediatric cases require immediate empirical intravenous antibiotic therapy for 2 to 5 days because of the risk of occult orbital cellulitis or, rarely, worsening to orbital cellulitis and its complications.	**Co-amoxiclav[2]** oral/IV DO NOT use in penicillin allergic patients (Switch to Co-amoxiclav oral once stable) **DURATION: 7 - 10 days**	**Cefotaxime[2]** or **Ceftriaxone[2]** IV CAUTION in penicillin allergic patients (Switch to Clindamycin oral once stable) In patients with penicillin anaphylaxis use **Clindamycin** IV (Switch to Clindamycin oral once stable) **DURATION: 7 - 10 days**

1. BMJ Best Practice: Pero-orbital and orbital cellulitis. March 2018 https://bestpractice.bmj.com/topics/en-gb/734
2. If severe infection, consider adding in Clindamycin as a second agent, and contact consultant microbiologist on-call.

4.10 Bone and joint

- Osteomyelitis
- Septic Arthritis

Osteomyelitis[1,2]	First Line Choice	Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective
Seek urgent referral to Orthopaedics and Microbiology. Obtain blood cultures to test for sensitivities.	**High dose Flucloxacillin** IV DO NOT use in penicillin allergic patients Addition of second agent should follow after 48 hours. Choice should be guided by microbiology considering culture results/response to initial therapy. **Duration: see notes below[3,4]**	**Clindamycin** IV Addition of second agent should follow after 48 hours. Choice should be guided by microbiology considering culture results/response to initial therapy. **Duration: see notes below[3,4,5]**
If MRSA suspected or confirmed	**Vancomycin** IV Consider adding **Rifampicin** IV/oral Addition of second agent should follow after 48 hours. Choice should be guided by microbiology considering culture results/response to initial therapy. **Duration: see notes below[3,4]**	**Teicoplanin** IV Consider adding **Rifampicin** IV/oral Addition of second agent should follow after 48 hours. Choice should be guided by microbiology considering culture results/response to initial therapy. **Duration: see notes below[3,4]**

Notes:

1. BNFc: Musculoskeletal system infections, antibacterial therapy. https://bnfc.nice.org.uk/treatment-summary/musculoskeletal-system-infections-antibacterial-therapy.html
2. Yeo Andrea, Ramachandran Manoj. Acute haematogenous osteomyelitis in children BMJ 2014; 348 :g66
3. Overall anticipated duration of 6 weeks (counting both IV and oral). IV to oral switch may not always be appropriate as it is difficult to achieve adequate concentrations of some antimicrobials in bone and joints. A minimum of 2 weeks IV therapy is usually recommended.
4. Please ensure the full course length is prescribed once the diagnosis and antimicrobial plan have been confirmed.
5. High-dose oral clindamycin may be appropriate once patient is stable – seek microbiology advice.

Septic Arthritis[1,2,3]	**First Line Choice**	**Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective**
Seek urgent referral to Orthopaedics and discuss case with Consultant Microbiologist on-call Obtain blood cultures to test for sensitivities.	**High dose Flucloxacillin** IV DO NOT use in penicillin allergic patients If Gram-negative organism suspected add **Cefotaxime** IV CAUTION in penicillin allergic patients Addition of second agent should follow after 48 hours. Choice should be guided by microbiology considering culture results/response to initial therapy. **Duration: see notes below**[4,5]	**Clindamycin** IV Seek advice from Consultant Microbiologist on call if suspecting gram negative organism. Addition of second agent should follow after 48 hours. Choice should be guided by microbiology considering culture results/response to initial therapy. **Duration: see notes below**[4,5,6]
If MRSA suspected or confirmed	**Vancomycin** IV Addition of second agent should follow after 48 hours. Choice should be guided by microbiology considering culture results/response to initial therapy. **Duration: see notes below**[4,5]	**Teicoplanin** IV Addition of second agent should follow after 48 hours. Choice should be guided by microbiology considering culture results/response to initial therapy. **Duration: see notes below**[4,5]

Notes:

1. BNFc: Musculoskeletal system infections, antibacterial therapy. https://bnfc.nice.org.uk/treatment-summary/musculoskeletal-system-infections-antibacterial-therapy.html
2. Agarwal A. and Aggarwal AN. Bone and Joint Infections in Children: Septic Arthritis. Indian J Pediatr. 2016;83(8):825-33
3. Pääkkönen M. and Peltola, H. Management of a child with suspected acute septic arthritis. Archives of Disease in Childhood 2012;97:287-292.
4. Overall anticipated duration of 4-6 weeks, but may be longer if complicated. IV to oral switch may not always be appropriate as it is difficult to achieve adequate concentrations of some antimicrobials in bone and joints. A minimum of 2 weeks IV therapy is usually recommended.
5. Please ensure the full course length is prescribed once the diagnosis and antimicrobial plan have been confirmed.
6. High-dose oral clindamycin may be appropriate once patient is stable – seek microbiology advice.

5 Prophylaxis

5.1 Medical Prophylaxis

Medical prophylaxis by indication	First Line Choice	Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective	Additional notes
Close contacts of Meningococcal disease[1]	**Ciprofloxacin[2] oral** **Dosing guide:** Less than 1 year old: 30mg/kg (max 125mg) single dose 1-4 years old: 125mg single dose 5–11 years old: 250mg single dose 12 years old and above: 500mg single dose	**Rifampicin oral** **Dosing guide[3]:** 0–2 months old: 20 mg twice daily for 2 days 3–11 months old: 40mg twice daily for 2 days 1–2 years old: 100mg twice daily for 2 days 3–4 years old: 150mg twice daily for 2 days 5–6 years old: 200mg twice daily for 2 days 7–12 years old: 300mg twice daily for 2 days 12 years old and above: 600mg twice daily for 2 days **Ceftriaxone IM single dose[4]** CAUTION in penicillin allergic patients	[1] After discussion with Health Protection Agency [2] Ciprofloxacin can be taken independently of mealtimes but should preferably be taken on an empty stomach, as the active substance is more rapidly absorbed. DO NOT take with dairy products (i.e., milk, yoghurt). Ensure 2 hours gap. [3] Dosing guide for children under 12 years old is based on average weight. For patients at extremes of body weight, please contact pharmacy for advice [4] Not routinely recommended as injection only and is painful, but is recommended option in pregnancy. See BNFc for dosing https://bnfc.nice.org.uk/drug/ceftriaxone.html#indicationsAndDoses **References** PHE Guidance for public health management of meningococcal disease in the UK: Updated August 2019 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/829326/PHE_meningo_disease_guideline.pdf
Close contacts of invasive *H influenzae* type B disease[1]	**Rifampicin oral** **Dosing guide:** 0–3 months old: 10mg/kg once a day for 4 days Over 3 months old: 20mg/kg (max 600mg) once a day for 4 days	**Ceftriaxone IV (or can use IM route)[2]** CAUTION in penicillin allergic patients **Dosing guide:** Less than 12 years old: 50mg/kg once a day for 2 days Over 12 years old: 1g once a day for 2 days	[1] After discussion with Health Protection Agency [2] Not routinely recommended as IM injection as it is painful **References** PHE Revised recommendations for the prevention of secondary Haemophilus influenzae type b (Hib) disease: Updated July 2013 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/231009/Revised_recommendations_for_the_preventions_of_secondary_Haemophilus_influenzae_type_b_disease.pdf

Medical prophylaxis by indication	First Line Choice	Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective	Additional notes
Vulnerable close contacts of pertussis within 3 weeks of onset of cough in index case	**Clarithromycin[1] oral** **Dosing guide:** 1 month to 11 years old: Based on body weight as below < 8kgs 7.5mg/kg twice a day for 7 days 8-11kg 62.5mg twice a day for 7 days 12-19kg 125mg twice a day for 7 days 20-29kg 187.5mg twice a day for 7 days 30-40kg 250mg twice a day for 7 days 12 to 17 years old: 500mg twice a day for 7 days **Azithromycin[2] oral** **Dosing guide:** 1-6 months old: 10mg/kg once a day for 3 days Over 6 months old: 10mg/kg (max 500mg) once a day for 3 days	**Co-trimoxazole[3] oral** **Dosing guide:** 6 weeks to 5 months old: 120mg twice a day for 7 days 6 months to 5 years old: 240mg twice a day for 7 days 6-11 years old: 480mg twice a day for 7 days 12-17 years old: 960mg twice a day for 7 days	[1] Clarithromycin is the preferred agent for use in infants below 1 month of age. [2] Azithromycin and clarithromycin are the preferred antibiotics in children over 1 year given the adverse effects associated with erythromycin. Azithromycin may have better compliance as the regime entails fewer doses [3] Not licensed for infants below 6 weeks **References** PHE Guidelines for the Public Health Management of Pertussis in England: May 2018 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/762766/Guidelines_for_the_Public_Health_management_of_Pertussis_in_England.pdf
Asplenia or sickle-cell disease	**Phenoxymethyl-penicillin[1] oral** DO NOT use in penicillin allergic patients **Dosing guide:** <1 years old: 62.5mg twice daily long term 1-4 years old: 125mg twice daily long term >5 years old: 250mg twice daily long term	**Erythromycin[2] oral** **Dosing guide:** 1-23 months old: 125mg twice daily long term 2-7 years old: 250mg twice daily long term >8 years old: 500mg twice daily long term	[1] Unless patient is already on another beta-lactam antibiotic: [2] BNF advises that antibiotic prophylaxis with erythromycin is not fully reliable. It may be discontinued in those >5 years old with sickle-cell disease who have received pneumococcal immunisation and do not have a history of severe pneumococcal infection. NB: clarithromycin not licenced for this indication. Davies, et al. Review of guidelines for the prevention and treatment of infection in patients with an absent or dysfunctional spleen: *British Journal of Haematology, 2011; 155: 308–317*
	Stand by course of antibiotics - All patients should carry an emergency 7 supply of treatment antibiotics for immediate use should symptoms of infection occur, and be instructed to seek medical advice urgently.		

Medical prophylaxis by indication	First Line Choice	Alternatives where first line choice contraindicated (e.g. allergy), not tolerated or not effective	Additional notes
Nephrotic syndrome	**Phenoxymethyl-penicillin oral** until in remission DO NOT use in penicillin allergic patients **Dosing guide:** <1 years old: 62.5mg twice daily long term 1-5 years old: 125mg twice daily long term 6-11 years old: 250mg twice daily long term	**Discuss with microbiologist**	Should be prescribed to oedematous/ascitic patients to protect against pneumococcal infection. If peritonitis is suspected then cover for Gram negative organisms is recommended until cultures are available.
Urinary tract infection	Antibiotic prophylaxis is not routinely indicated at any age but may be useful in recurrent symptomatic UTI. See section 4.1		NICE Guideline NG112: Urinary tract infection (recurrent): antimicrobial prescribing. October 2018 https://www.nice.org.uk/guidance/ng112
Children in a household where an active TB case is suspected or confirmed	Children less than two years of age who have contact with a smear-positive case of pulmonary or laryngeal TB should be given chemoprophylaxis immediately, even if their initial tuberculin skin test is negative and then tuberculin tested after six weeks. If the skin test is negative, BCG vaccine is given. Seek advice from TB team		Green Book Chapter 32. August 2018 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/731848/_Greenbook_chapter_32_Tuberculosis_.pdf

5.2 Surgical Prophylaxis

Surgical prophylaxis by specialty	Scroll down for dosing advice. For single Peri-Operative dosage only. Seek Pharmacist input if renal dose adjustments required. Seek Microbiology input if further (or post-op) doses required.			Additional notes
	Drug of choice	**Penicillin allergy (minor rash)**	**Penicillin anaphylaxis**	
Burns	No prophylaxis required			
ENT/Maxillofacial	Co-Amoxiclav DO NOT use in penicillin allergic patients	Cefuroxime+ Metronidazole CAUTION in penicillin allergic patients	Clindamycin*	*add gentamicin if complex or contaminated
General Surgery	Co-Amoxiclav DO NOT use in penicillin allergic patients	Cefuroxime+ Metronidazole CAUTION in penicillin allergic patients	Gentamicin + Metronidazole	
Ophthalmology	No prophylaxis required , surgeons use antimicrobial eye drops based on their discretion or preferences			
Orthopaedic Elective Surgery	Flucloxacillin + Gentamicin DO NOT use in penicillin allergic patients	Cefuroxime CAUTION in penicillin allergic patients	Teicoplanin + Gentamicin	
Orthopaedic Closed fracture	Flucloxacillin + Gentamicin DO NOT use in penicillin allergic patients	Cefuroxime CAUTION in penicillin allergic patients	Teicoplanin + Gentamicin	
Orthopaedic Open fracture	Co-Amoxiclav DO NOT use in penicillin allergic patients	Cefuroxime+ Metronidazole* CAUTION in penicillin allergic patients	Teicoplanin + Metronidazole*	*add gentamicin if soiling present
Urology	Gentamicin*	Gentamicin	Gentamicin	*Co-amoxiclav if gentamicin contraindicated
Any other surgical prophylaxis	Refer to Antibiotic Formulary and Prescribing Advice for Adult Patients for specific procedures, using BNFC to adjust doses by weight. Contact Antimicrobial pharmacists or Microbiologists if contraindicated.			

Surgical Prophylaxis Doses - Please note this is for single Peri-Operative dosage only. Seek Pharmacist input if renal dose adjustments required. Seek Microbiology input if further (or post-op) doses required.

Antibiotic	Dose	
Cefuroxime CAUTION in penicillin allergic patients	50mg/kg	(max. 1.5g)
Clindamycin	5mg/kg	(max. 450mg)
Co-Amoxiclav DO NOT use in penicillin allergic patients	30mg/kg	(max. 1.2g)
Flucloxacillin DO NOT use in penicillin allergic patients	25mg/kg	(max. 1g)
Gentamicin	2.5mg/kg	(max. 160mg)
Metronidazole	7.5mg/kg	(max. 500mg)
Teicoplanin	10mg/kg	(max. 400mg)

6 Administration of Metronidazole and Vancomycin formulations in patients that cannot swallow tablets/capsules whole

6.1 Metronidazole tablets

Metronidazole (oral/enteral administration) is used for first line treatment of Clostridium Difficile infection.

Where ever possible this should be administered orally as tablets. If a patient is unable to swallow the tablets whole, the tablets should be dispersed in water and administered (unlicensed).

Metronidazole suspension is not recommended for any patient with diarrhoea or feeding tubes. This is because metronidazole tablets contain the active drug, whereas the suspension contains a pro-drug requiring activation by gastric enzymes to take effect. Patients with feeding tubes are at risk of receiving little or no effect from the suspension because the gastric enzyme response may be reduced or bypassed. In the case of diarrhoea, it is questionable whether the gastric enzymes have had enough time to act on the drug before it is expelled from the GI tract. Therefore, to ensure the active drug has a reasonable chance of taking effect in the gut, it is better to use the tablet formulation.

It is noted that the tablets do not taste very pleasant, especially when dispersed, but as the dose should be administered with food anyway, this should help mask the taste. Anticipated benefits include more effective antimicrobial treatment, timely recovery from infection, and reduced Length of Stay.

How to give metronidazole tablets enterally:

Note: Only certain brands and strengths can be crushed and dispersed. Always read the information leaflet. *Use the following for guidance only.*

400 mg tablets will disintegrate within 5 minutes if agitated continuously in 10mL of water to form a fine dispersion, which will flush down an 8Fr NG tube but it requires frequent shaking as particles settle quickly in the syringe - Norton Brand
Crescent Brand 200mg and 400mg Tablets
Lexon Brand OLP 400mg Tablets

- Stop the enteral feed.
- Flush the enteral feeding tube with the recommended volume of water.
- Disperse the tablet in up to 15mL of water, ensuring that there are no large particles of tablet.
- Draw this into an appropriate size and type of syringe.
- Flush the medication dose down the feeding tube.
- Ensure that any remaining drug is drawn up from the container, using up to 15mL water. Flush this via the same syringe into the feeding tube (this will ensure total dose is administered).
- Finally, flush the enteral feeding tube with the recommended volume of water.
- Re-start the feed, unless a prolonged break is required.

References:

Handbook of Drug Administration via Enteral Feeding Tubes
Via Medicines Complete
Antimicrobial Pharmacy message of the month
April edition 2019
Metronidazole 200mg Tablets
Last Updated on eMC 15-Dec-2015

6.2 Oral Administration of Vancomycin Injection

Vancomycin is used enterally for the treatment of Clostridium Difficile infection.

Where ever possible this should be administered orally as capsules. If a patient is unable to swallow capsules, or has an enteral feeding tube, an alternative is required.

Intravenous administration of Vancomycin is not effective for treatment of *Clostridium Difficile.*

Vancomycin given enterally is not absorbed and does not treat systemic infections.

How to give vancomycin injection enterally:

NOTE: Different brands have different guidance for the amount of water for injection (WFI) to add to the vial. Please read the product information leaflet to check the details.

Wockhardt, Flynn and Hospira and Bowmed and Consilient Health* Brands:

- Dilute a 500mg vial with 10mL WFI, or a 1 gram vial with 20mL WFI, to produce a solution of 50mg/mL.
- On the reconstituted vial record the strength (50mg/mL), and an expiry date and time of 24 hours. Store the reconstituted vial in the fridge.
- The usual dose is 125mg (2.5mL) four times a day.
- Each dose needs to be further diluted to 30mL for administration.
- If necessary, the dose can be mixed with flavoured syrups to improve taste, immediately before administration.
- Enteral vancomycin MUST be administered using an enteral syringe.
- One 500mg vial should last 24 hours at usual dose; higher doses may be used in difficult cases.

Consilient Health Ltd Vancomycin Brand:
The product is only licensed to be used as an infusion for injection; therefore, oral administration of product is unlicensed. This is the brand that has been awarded contractual tender by CMU and therefore the brand most likely to be stocked at ULHT and NLaG over the course of this contract. On comparison to brands which are licenced for intravenous and oral use (Vancocin; Flynn Pharm Ltd), it is noted that both products contain vancomycin hydrochloride, with no additional excipients listed, and are reconstituted in exactly the same manner. ULHT and NLaG relevant Committees have recommended that where it is not possible to use the licenced capsule formulation of Vancomycin, the Consilient Health brand of IV Vancomycin be used off-label for oral treatment of Clostridium difficile infection in accordance with local guidelines. This approach has also been taken by Yorkshire and Humber Antimicrobial Pharmacy Group. The issue of not being licensed for oral administration has been highlighted to CMU as a consideration that needs to be included in tender specifications going forward.

References:

Vancomycin Hydrochloride 500mg and 1g Powder for Concentrate for Infusion
Last Updated on eMC 10/2017.Hospira UK Ltd
Vancomycin 500mg and 1g Powder for Solution for Infusion
Last Updated on eMC 15/02/2019 Wockhardt UK Ltd
Vancomycin Powder for Solution
Last Updated on eMC 07/03/2018 Flynn Pharma Ltd
Vancomycin Hydrochloride Powder for Solution
Last Updated on eMC 03/05/2018 Consilient Health Ltd
Vancomycin 1000 mg Powder for concentrate for solution for infusion vials
Last updated on eMC 03/07/2019 Bowmed Ibisqus Ltd
Handbook of Drug Administration via Enteral Feeding Tubes via Medicines Complete