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The Pennine Acute Hospitals NHS Trust

Quick Reference Sheet for Antibiotic Policy for Adult Patients (EDT007) V6.2: Common Infections

Please refer to the Antibiotic Policy for full and detailed guidance. Please check for and discuss patients with a previous history of Clostridium difficile, MRSA, CPE or multi-drug resistant organisms with microbiology. Version 6.2

Community acquired pneumonia

Calculate CURB-65 score to assess severity: **C**onfusion, **U**rea: > 7mmol/L, **R**espiratory rate: ≥ 30/min, **B**lood pressure: SBP < 90 mmHg or DBP ≤60 mmHg, **A**ge: ≥ 65 years

Mild (CURB-65 = 0-1)*

Amoxicillin PO 500mg TDS for 5 days

In penicillin allergy:
Doxycycline PO 200mg STAT then 100mg OD for 5 days
OR
Clarithromycin PO 500mg BD for 5 days

Moderate (CURB-65 = 2)*

Amoxicillin PO 1g TDS PLUS Clarithromycin PO 500mg BD for 5-7 days

In penicillin allergy:
Doxycycline PO 200mg STAT then 100mg BD for 5-7 days
OR
Clarithromycin PO 500mg BD for 7 days

Severe (CURB-65 ≥3)

Levofloxacin IV 500mg BD

Alternative treatment :
discuss with microbiology

Switch to oral as soon as clinically indicated:
Amoxicillin PO 1g TDS PLUS Clarithromycin PO 500mg BD

In penicillin allergy:
Levofloxacin PO 500mg BD

*If contraindicated to PO therapy please see full antibiotic policy.

Sepsis

Please see sepsis quick reference chart

Hospital acquired pneumonia

Mild early onset (<5 days in hospital)*

Amoxicillin PO 500mg TDS for 5-7 days

In penicillin allergy:
Doxycycline PO 200mg STAT then 100mg OD for 5-7 days
OR
Clarithromycin PO 500mg BD for 5 days

Moderate early onset (<5 days in hospital)*

Amoxicillin PO 1g TDS PLUS Clarithromycin PO 500mg BD for 5-7 days

In penicillin allergy:
Doxycycline PO 200mg STAT then 100mg BD for 5-7 days
OR
Clarithromycin PO 500mg BD for 5-7 days

Severe or Late onset (> 5 days in hospital) or recent health-care exposure

Levofloxacin PO/IV 500mg BD for 7-10 days

Alternative treatment :
discuss with microbiology

*If contraindicated to PO therapy please see full antibiotic policy.

Clostridium difficile

Vancomycin PO 125mg QDS for 10 -14 days

If oral treatment is NOT appropriate:
Metronidazole IV 500mg TDS

Aspiration pneumonia

Community acquired and/or mild/moderate infection

Amoxicillin IV/PO 500mg-1g TDS PLUS Metronidazole IV 500mg TDS (or PO 400mg TDS) for 5-7 days

In penicillin allergy:
Clarithromycin PO/IV 500mg BD PLUS Metronidazole IV 500mg TDS (or PO 400mg TDS) for 5-7 days

Hospital acquired and/or severe infection

Levofloxacin IV/PO 500mg BD PLUS Metronidazole IV 500mg TDS (or PO 400mg TDS) for 5-7 days

Alternative treatment:
Meropenem IV 1g TDS for 5-7 days

Cellulitis
(excluding orbital cellulitis)

If IV treatment is needed:
Flucloxacillin IV 1-2g QDS

Alternative treatment:
Mild:
Doxycycline PO 200mg STAT then 100mg OD
Moderate/severe:
Clindamycin IV 600mg QDS

If oral treatment is appropriate:
Flucloxacillin PO 500mg – 1g QDS

Alternative treatment:
Mild:
Doxycycline PO 200mg STAT then 100mg OD
Moderate/severe:
Clindamycin PO 300-450mg QDS

Remember: "Start Smart then Focus" when prescribing

Start Smart:

- Do not start antimicrobial therapy unless there is clear evidence of an infection
  - take a thorough drug allergy history
  - initiate prompt effective antibiotic treatment
  - comply with local antimicrobial prescribing guidance
  - document clinical indication, drug name, dose and route on drug chart and in clinical notes
  - include review/stop date or duration
  - obtain cultures prior to commencing therapy where possible

Then Focus:

- Review the clinical diagnosis and the continuing need for antibiotics at 48-72 hours and documenting a clear plan of action (stop, IV to PO switch, change the antibiotic, continue and document next review date or stop date or refer for Outpatient Parenteral Antibiotic Therapy (OPAT).

Urinary tract infections

Treatment choice should take into account and be directed by available sensitivities

Uncomplicated lower UTI:

Nitrofurantoin PO 50mg QDS

Alternative treatments:
Trimethoprim PO 200mg BD
OR
Pivmecillinam PO 400mg STAT then 200mg TDS

Pyelonephritis:

If IV treatment is needed:
Gentamicin IV

- 5mg/kg if GFR >30 mL/min
- 3mg/kg if GFR 10 to 30 mL/min
- if GFR less than 10 mL/min contact microbiology for advice.

Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least** 24 hours after the initial dose. See full antibiotic policy for further advice.

Alternative treatment:
Ciprofloxacin IV 400mg BD

If oral treatment is appropriate:
Ciprofloxacin PO 500mg BD

Alternative treatment:
Co-amoxicalv PO 625mg TDS

Additional points to consider:

- If MRSA bacteraemia is suspected: Add Vancomycin IV (or Teicoplanin IV) if not already in the specified regimen.
- Dose stated are for guidance and relate to adults of average body weight with normal renal and hepatic functions. Dose adjustments may be needed in some patients.
- Check for previous history of MRSA, C.difficile and CPE infections.
- See full antibiotic policy for further advice.

This Quick Reference sheet has been provided to aid use at the point of need; however it does not remove your responsibility to ensure that you are familiar with the contents of the full document to which it relates

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Quick Reference Sheet for Antibiotic Policy for Adult Patients (EDT007) V6.2: Sepsis

Please refer to the Antibiotic Policy for full and detailed guidance. Please check for and discuss patients with a previous history of Clostridium difficile, MRSA, CPE or multi-drug resistant organisms with microbiology. Version 6.2

Sepsis

Sepsis is defined as a life-threatening organ dysfunction due to a dysregulated host response to **infection**

Is the patient neutropenic or at risk of neutropenic sepsis?

- No → Is the source of infection identifiable?
  - No → Is the patient's systolic blood pressure ≤ 90mmHg or dropped > 40 mmHg from normal?
    - No → treat as **sepsis of unknown origin**
    - Yes → treat as **sepsis of unknown origin with associated hypotension**
  - Yes → treat as **according to suspected cause**
- Yes → treat as **neutropenic sepsis**

Sepsis of unknown origin:

First line:	Alternative in penicillin allergy
Gentamicin IV*#¤ PLUS Amoxicillin IV 1g TDS PLUS Metronidazole IV 500mg TDS	Gentamicin IV*#¤ PLUS Teicoplanin IV 600mg 12 hourly for 3 doses then OD*¤ PLUS Metronidazole IV 500mg TDS

Gentamicin IV:

- 5mg/kg if GFR >30 mL/min
- 3mg/kg if GFR 10 to 30 mL/min
- if GFR less than 10 mL/min contact microbiology for advice.

Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least** 24 hours after the initial dose. See full antibiotic policy for further advice. If a current GFR cannot be obtained in an emergency situation utilise past results to inform dose selection.

Ensure that the appropriate screening and action tool is completed and that the sepsis six actions are completed when necessary.

Patients MUST be reviewed within SIX hours of treatment initiation and antibiotic therapy rationalised according to patient response and available diagnostic results. Subsequently the patient should be reviewed at least DAILY. Once a source of infection has been identified please refer to the appropriate section of the full antibiotic policy for specific de-escalation and oral options.

Ensure that the initial selection of antibiotics takes into account relevant previous microbiology resistance history.

Neutropenic Sepsis:

First line:	Alternative in penicillin allergy not anaphylaxis and/or history of resistance to Piperacillin/tazobactam:	Alternative in penicillin allergy associated with anaphylaxis:
Piperacillin / tazobactam IV 4.5g TDS* If not available use: Meropenem IV 1g TDS*	Meropenem IV 1g TDS*	Aztreonam 2g IV TDS* PLUS Teicoplanin IV 600mg 12 hourly for 3 doses then OD*¤ PLUS Metronidazole IV 500mg TDS If Aztreonam is not available please refer to full antibiotic policy for alternatives.

Sepsis of unknown origin with associated hypotension:

First line:	Alternative in penicillin allergy associated with anaphylaxis
Meropenem IV 1g TDS*	Gentamicin IV*#¤ PLUS Teicoplanin IV 600mg 12 hourly for 3 doses then OD*¤ PLUS Metronidazole IV 500mg TDS

If MRSA is suspected: Add Vancomycin¤ IV (or Teicoplanin¤ IV) if not already in the specified regimen. See full antibiotic policy for further advice.

A carbapenem should only be continued after discussion with microbiology or ID

*Dose adjustments may be needed in renal impairment

¤ Therapeutic drug monitoring must be conducted

Use treatment for suspected infection cause:

Pneumonia:

First line:	Alternative:
Levofloxacin IV 500mg BD*	discuss with microbiology

Urological:

First line:	Alternative:
Gentamicin IV#¤	Ciprofloxacin IV 400mg BD* OR Ciprofloxacin PO 500mg BD*

Severe Streptococcal tonsillitis:

First line:	Alternative:
Benzylpenicillin IV 1.2g QDS	Clarithromycin IV 500mg BD

Aspiration pneumonia:

First line:	Alternative:
Levofloxacin IV 500mg BD* PLUS Metronidazole IV 500mg	Meropenem IV 1g TDS*

Biliary / GI Tract Associated Infections:

First line:	Alternative:
Amoxicillin IV 1g TDS PLUS Metronidazole IV 500mg TDS PLUS Gentamicin IV#¤	Ciprofloxacin IV/PO 500mg BD* PLUS Metronidazole IV 500mg TDS

Abdominal/ pelvic sepsis :

First line:	Alternative:
Amoxicillin IV 1g TDS PLUS Metronidazole IV 500mg TDS PLUS Gentamicin IV*#¤	Vancomycin IV*¤ (see full antibiotic policy for dose advice) PLUS Metronidazole IV 500mg TDS PLUS Gentamicin IV*#¤

Cellulitis:

First line:	Alternative:
Flucloxacillin IV 1-2g QDS	Clarithromycin IV 500mg BD OR Clindamycin IV 600mg QDS

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Reference Number: EDT007 **Version Number:** 6.2 **Date of Issue:** 10/10/17

Antibiotic Policy for Adult Patients

What is this document for?	The aim of this Policy is to provide direction on empirical treament for infections that are commonly encountered in the hospital settings. This Policy is by no means comprehensive. In difficult, complicated situations, prescribers are advised to consult a senior colleague and/or a Microbiologist or ID Physician. The empirical choice of antimicrobial must be reviewed and modified accordingly when the definite pathogen has been identified.
Who needs to know?	This Policy refers to all adult patients in all clinical areas and therefore all doctors, independent prescribers, supplementary prescribers, pharmacists, pharmacy technicians, nurses and midwives should be aware of the content of this document.
Related PAHNT Documents:	• Medicines Policy (EDC018) • Prescribers' Update – Penicillin Allergy (EDT010) • Antibiotic Policy for Paediatrics (EDT016) • Use of the Pennine Acute Hospitals NHS Trust Drug Prescription & Administration Record (CPDI111) • Procedure for the Administration of Prescribed Medicines to Inpatients (EDT004) • Early Management of the Acute Hot Joint (CPME054) • Guidelines for Continuous Infusion of Vancomycin (for use in ICU only) (EDT015) • Clinical Record Keeping Policy (EDN004) • Incident Reporting & Investigation Policy (EDQ008) • Methicillin Resistant Staphylococcus Aureus (MRSA) Policy (CPDI023) • Guidelines for the management of adult patients with suspected sepsis including neutropenic sepsis (CPME172) • Guideline for Management of Asymptomatic Neonates at Risk of Early Onset Sepsis (CPWC199) • Guideline for the Management of Group B Streptococcus in Pregnancy and Labour (CPWC071) • Standard Operational Procedure for the Collection of Blood Cultures (CPDI085)
Related Legislation/ Obligations:	• Start Smart - Then Focus. Antimicrobial Stewardship Toolkit for English Hospitals (2015); https://www.gov.uk/government/publications/antimicrobial-stewardship-start-smart-then-focus • UK Five Year Antimicrobial Resistance Strategy 2013 to 2018; (2013) https://www.gov.uk/government/publications/uk-5-year-antimicrobial-resistance-strategy-2013-to-2018 • Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use NG15 (2015); http:// www.nice.org.uk/guidance/ng15 • The Health and Social Care Act 2008: Code of Practice on the

	prevention and control of infections and related guidance (2008, updated 2015) https://www.gov.uk/government/publications/the-health-and-social-care-act-2008-code-of-practice-on-the-prevention-and-control-of-infections-and-related-guidance

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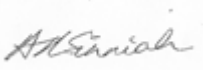
Ratified by:	 Dr Anton Sinniah, Chair of PADAT & Deputy Medical Director
Date Ratified:	13/07/17 Urgent amends ratified 14/08/17 (by Chris Brookes CMO) Urgent amends ratified 09/10/17 (by Chris Brookes CMO)
Replaces:	Antibiotic Policy for Adult Patients version 5.3 (EDT007) Antibiotic Policy for Adult Patients version 6 (EDT007) – see addendum Antibiotic Policy for Adult Patients version 6.1 (EDT007) – see addendum
How is this different from the previous document?	• The whole policy has been reviewed due to the need to minimise the use and recommendation of piperacillin/tazobactam within the Trust. Subsequently all sections where this antibiotic was previously recommended as a treatment option have been modified. • The recommended dose of gentamicin for single treatment and once daily treatment has been reduced to 5mg/kg. Subsequently the relevant sections have been updated to reflect this change. • The “Quick Reference Sheet for Antibiotic Policy for Adult Patients: Common Infections” has been updated to reflect the changes in the full policy. • A “Quick Reference Sheet for Antibiotic Policy for Adult Patients: Sepsis” has been added and reflects the changes made to the full policy. • Section 1: Re-worded and spelling errors corrected. • Section 3.1: Re-worded and spelling errors corrected. • Section 3.2: Contact details updated. • Section 3.3: Temocillin added to list. • Section 3.4: Re-worded and spelling errors corrected. • Section 3.5: Re-worded and spelling errors corrected. • Section 3.6: Definition amended and flow diagram for treatment options added. • Section 3.6.1: Antibiotic recommendations updated. • Section 3.6.2: Section added for treatment of “Sepsis of unknown origin with associated hypotension”. • Section 3.6.3: Antibiotic recommendations updated. • Section 3.7: Flow diagram for treatment added and dexamethasone dose amended.

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	Section 3.7.4: Cautions "To avoid excessive dosage in obese patient's parenteral dose should be calculated on the basis of ideal weight for height" and "Aciclovir is **not** recommended for the treatment of viral meningitis including HSV, VZV and enterovirus" added. • Section 3.8.2: Alternative treatment for osteomyelitis changed from vancomycin to teicoplanin. • Section 3.9: Cefotaxime changed to ceftriaxone for treatment of orbital cellulitis and epiglottis. Erythromycin changed to clarithromycin as macrolide of choice throughout section. Section for the treatment of severe tonsillitis added. • Section 3.10.1: Erythromycin changed to clarithromycin as macrolide of choice for Campylobacter Enteritis. Flow diagram for C.difficile updated. • Section 3.10.4: Antibiotic recommendations updated. • Section 3.10.5: Antibiotic recommendations updated. • Section 3.11.2: Antibiotic recommendations updated. • Section 3.11.4: Antibiotic recommendations updated. • Section 3.11.5: Antibiotic recommendations updated. • Section 3.13: Antibiotic recommendations updated. Throughout section, azithromycin changed to clarithromycin as macrolide of choice. Section 3.13.5: Influenza added. • Section 3.15.2: Increased frequency of flucloxacillin dose due to weight amended to 85kg. Amoxicillin dose frequency amended to four hourly. • Section 3.15.3: Advice regarding gentamicin level monitoring updated. • Section 3.16: Antibiotic recommendations updated. • Section 3.17: Antibiotic recommendations updated. • Section 3.19: Antibiotic recommendations updated. • Section 3.20.2.2: Biliary reconstruction and hepatojejunostomies, liver resection, pancreatectomy, Whipple's procedure, ablation cases sections removed. • Section 3.20.3: Antibiotic recommendations updated. • Section 3.23: Section re-written to accommodate recommended dose adjustment from 7mg/kg to 5mg/kg and subsequently advice regarding relevant monitoring requirements. • Section 5: HSV and VZV added.
What dissemination & training arrangements have been made?	This Policy will be available via the Document Management System. It will be announced in the weekly bulletin. The Policy will be introduced to the Medical staff on the Doctors' Induction days and prescribers are encouraged to refer regularly to the Antibiotic Policy and the Summary Charts.
Review arrangements:	Review every 3 years or earlier should a change in legislation best practice or other circumstance dictate.
Safety Arrangements:	Compliance & effectiveness of this policy will be via accident, incident & complaints monitoring, in addition to compliance audits. Staff experiencing difficulties with implementing this policy should contact their line manager. Ward pharmacists must query any non-compliance with the Policy, inappropriate prolonged antibiotic duration, inappropriate IV duration, restricted antibiotic prescribing on their routine ward visit and refer to the Microbiologist for advice

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	if necessary.
Addendum:	Error in quick reference chart updated to reflect full policy recommendations. Piperacillin/tazobactam added to restricted list IV option for moderate CAP (CURB-65=2) changed to clarithromycin form levofloxacin Wording in section 3.17 changed in “moderate” diabetic foot infections to “systemically well with one of the following”.

Priority Level: 1
Impact Level: Trustwide
Keywords: empirical antimicrobial therapy, common infections, surgical prophylaxis, antibiotics, antibiotic, antimicrobials, gentamicin, vancomycin

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1. What is this Policy for?

1.1. The aim of this Policy is to provide direction on empirical treatment for infections that are commonly encountered in the hospital settings. This Policy is by no means comprehensive. In difficult, complicated situations, prescribers are advised to consult a senior colleague and/or a Microbiologist or ID Physician (contact via Switchboard during out-of-hours). Whenever possible, specimens for microbiological examination should be obtained before starting therapy. Blood cultures are an essential part of the initial work-up for a febrile and/or septic patient.

1.2. In many situations antibiotics are administered empirically when the precise aetiological agent and its antimicrobial susceptibilities are unknown. The empirical choice of antimicrobial must be reviewed and modified accordingly when the definite pathogen has been identified.

1.3. A quick summary chart has been devised to illustrate the empirical therapy recommended for the commonest types of infections AND sepsis (See page 1 "Quick Reference Sheet for Antibiotic Policy for Adult Patients: Common Infections" and 2 "Quick Reference Sheet for Antibiotic Policy for Adult Patients: Sepsis").

1.4. This Policy also aims at promoting timely IV to Oral Antibiotic Switch (IVOS) to reduce inappropriate prolonged IV therapy.

1.5. This Policy covers therapeutic drug monitoring (TDM) to ensure antibiotics that have narrow-therapeutic index and require level monitoring are used safely and effectively.

1.6. This Policy includes a section for Surgical Antibiotic Prophylaxis. With reference to the SIGN Guidelines, SINGLE dose prophylaxis is recommended for clean to clean/contaminated surgeries, unless the procedure is prolonged or associated with significant blood loss. Moreover a treatment course of antibiotics may be warranted, in addition to the prophylaxis, in cases of dirty surgery or infected wounds.

1.7. This Policy refers to all adult patients in all clinical areas and therefore all doctors, independent prescribers, supplementary prescribers, pharmacists, pharmacy technicians, nurses and midwives should be aware of the content of this document. Specialist advice should be sought for treatment of pregnant women as some recommended antibiotic treatment choice may not be appropriate for this group of patients.

1.8. All doses stated are for guidance only and relate to adults of average body weight, normal renal and hepatic functions. Therefore, dosage adjustment may be necessary for patients with renal and hepatic impairment. Please contact the Pharmacy and/or Microbiology Departments to discuss doses for specific cases.

1.9. This policy should be used in conjunction with related Trust policies and guidelines including those listed in the 'Related PAHNT Documents' section on the title page.

2. Why do I need to know?

2.1. The Pennine Acute Hospitals NHS Trust (PAHT) is committed to promoting safe, effective and economical use of antimicrobials. As part of our on-going strategy to reduce the Healthcare Associated Infections (HCAIs), we are committed to reduce the rates of Clostridium difficile infection (CDI) and MRSA bacteraemia.

2.2. This policy provides direction on empirical treatment of infections that are commonly

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encountered in the hospital setting. The treatment options that are provided in this policy take into account both national guidance and local resistance patterns and have been produced to be relevant to the local healthcare setting.

3. What is the policy?

3.1. Introduction:

3.1.1. The Pennine Acute Hospitals NHS Trust (PAHT) is committed to promoting safe, effective and economical use of antimicrobials. As part of our on-going strategy to reduce the Healthcare Associated Infections (HCAIs), we are committed to reduce the rates of Clostridium difficile infection (CDI) and MRSA bacteraemia

3.1.2. Antibiotics that are known to be high-risk for CDI are: -

- **Cephalosporins** – are all restricted except when recommended as per the Antibiotic Policy or on Micro/ID advice.
- **Quinolones** i.e. Ciprofloxacin and Levofloxacin – use with extreme caution.
- **Clindamycin** - use with extreme caution.
- **Co-amoxiclav** - use with extreme caution.

3.1.3. Before prescribing high-risk antibiotics for CDI you must risk assess the patients for the likelihood of developing CDI by considering the antibiotic history within the last three months. Patients who have been treated with ≥ 3 courses of high-risk antibiotics within the last three months or ≥ 2 courses within the last four weeks will be at increased risk. Therefore, these patients must be treated with extreme caution, contact Microbiology or ID for advice.

3.1.4. Inappropriate and prolonged antibiotic courses, especially using broad-spectrum antibiotics have been shown to be associated with increased CDI risk. Subsequently, a stop/review must be documented.

3.1.5. Action Points: -

- Broad spectrum antibiotics may be used when the causative organism for an infection is unknown but must be reviewed and de-escalated to a narrow-spectrum antibiotic when the culture and sensitivity results are known.
- Document the indication for antibiotic therapy in the medical notes and on the medication chart (where possible).
- Prescribe a **STOP** date, specify a defined course length or at least a **REVIEW** date for a complicated infection when the stop date is based on the clinical response.
- Before prescribing a course of high-risk antibiotic, find out the antibiotic history and/or previous healthcare exposure within the last three months, including GP prescriptions and risk assess the patient for CDI.
- Check the PathLab report for any previous history of CDI, MRSA, CPE or previous acquisition of any multi-drug resistant bacteria.
- CDI can also occur in patients with no prior exposure to high-risk antibiotics; subsequently inappropriate use of any antibiotic is discouraged to prevent harm to patients and others.

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3.2. Contact Names and Numbers:

Microbiology:

During working hours		78362
Out-of-Hours		Contact Switchboard

Infectious Diseases:

ID Physician	NMGH	via Switchboard

Pharmacists:

Cathy Chow Lead Antimicrobial Pharmacist	NMGH	Bleep 4468
Emma Hughes Senior Antibiotic Pharmacist	TROH	Bleep 7791

3.3. Restricted List:

The following antibiotics can only be prescribed following discussion with the Consultant Microbiologist or ID Physician:

- Amikacin
- Caspofungin
- Cephalosporins IV i.e. cefotaxime, cefuroxime, ceftriaxone and oral cefalexin – unless indicated in the Antibiotic Policy
- Daptomycin
- Linezolid
- Meropenem
- Tigecycline
- Tobramycin
- Voriconazole (or Haematologist approval)
- Fidaxomicin
- Aztreonam
- Fosfomycin IV
- Temocillin
- Piperacillin/tazobactam

3.4. Penicillin/ beta-lactam allergy:

3.4.1. The full ‘Penicillin Allergy Guideline’ (EDT010) is available on the ‘Pharmacy’ section of the Policies & Documents page of the intranet.

3.4.2. It is not uncommon that patients who are labelled to be “penicillin-allergic” are not truly allergic to penicillin antibiotics. Patients who have a vague history of symptoms or symptoms of gastro-intestinal intolerance such as nausea, vomiting, diarrhoea probably do not have a true penicillin allergy. Studies have shown that people with a label of ‘penicillin allergy’ are more likely to be treated with broad-spectrum, non-penicillin antibiotics, such as quinolones, vancomycin and third-generation cephalosporins. However, use of these antibiotics in people with an unsubstantiated label of penicillin allergy may lead to antibiotic resistance and, in some cases, sub-optimal therapy. Therefore the benefits and risks of using penicillins should be weighed up against their risks of harm to the patient on an individual case by case basis, and in all cases allergy status clearly documented. Therefore, every effort should be made to establish the significance of the alleged penicillin-allergy by asking the following questions and they must be documented for future references:

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- Which antibiotic was taken?
- When did the event happen?
- What actually happened?
- What are the symptoms?

3.4.3. General hypersensitivity reactions to penicillins, such as rashes occur in 1-10% of exposed individuals. Anaphylactic reactions, which can be fatal, occur in less than 0.05% of the treated patients. Please note that patients who have a vague history of symptoms, or symptoms of gastro-intestinal intolerance are probably not truly allergic to penicillins.

3.4.4. Patients with a history of anaphylaxis, urticaria, angioedema or rash that occurs immediately after penicillin administration are at risk of further immediate hypersensitivity reactions and they should **NOT** receive further doses of penicillin or beta-lactam antibiotics. However, third generation cephalosporins and carbapenems may be used with caution

3.4.5. Patients with a history of minor rash (non-confluent & restricted to a small body area), or a rash that occurs more than 72 hours after penicillin administration are probably not allergic to penicillin. In these patients, penicillins or other beta-lactam related antibiotics should not be withheld for treatment of serious infections. In the hospital setting, using cephalosporins or carbapenems in such patients is not unreasonable. However, facilities and medications for resuscitation should be immediately available.

3.5. IV to Oral Antibiotic Switch Guideline

3.5.1. Introduction

Consider if initiating IV antibiotic is necessary as an appropriate oral equivalent will suffice for most infections.
In general, IV antibiotics should **ONLY** be started and continued when: -

- There is no equivalent oral formulation or alternative for the IV antibiotic, or
- Immediate attainment of high antibiotic serum levels is required, or
- Treating severely ill patients empirically, or
- Patients whose oral route is compromised, e.g.
  - Nil by mouth
  - Mechanical swallowing disorder
  - Unconscious
  - Intractable vomiting
  - Reduced GI absorption (e.g. severe diarrhoea, steatorrhoea, short bowel syndrome)

Review all IV antibiotic therapy at **24 hours** after starting and switch to oral therapy if the criteria listed in **Section 3.5.2** are fulfilled. In the majority of cases oral treatment can be started after one or two doses of IV treatment.

Please refer to the Flow Chart (Appendix 2) for a quick guidance on IV to Oral Antibiotic Switch.

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3.5.2. Criteria for an "Oral" Switch

The following criteria should be considered for "Oral" Switch: -

- Not suffering from any specific high-risk infection requiring prolonged course of IV antibiotic therapy e.g. Meningitis, infective endocarditis, septic arthritis, osteomyelitis, deep abscess, **(see Section 3.5.4)**
- Clinically improving on IV therapy, e.g.
  - Improving WBC
  - Body temperature trending normal
  - Improving CRP
  - Improving signs and symptoms of infection
- Absorption not compromised
- Ability for oral intake of medications

Please consult the Antibiotic Policy for Adult patients, Micro lab results or Microbiologist on the appropriate choice of oral antibiotic for the "Switch", or see **Section 3.5.3** for common switches.

In the majority of cases oral treatment can be started after one or two doses of IV treatment.

3.5.3. Timing of Switch

Most patients do not require any IV antibiotic therapy as oral equivalents will suffice.

The majority of patients with a severe infection requiring initial treatment with an IV antibiotic initially can be safely "switched" to oral therapy after **24 hours** if they are clinical improving. **However,** continued IV therapy is clinically indicated for a specific group of High-Risk Infections. **(Refer to Section 3.5.4)**

Patients on IV antibiotic therapy should be reviewed daily and "switched" to an appropriate choice of oral antibiotic as soon as clinically feasible if the criteria for an oral switch are fulfilled.

The oral switch can be a direct switch to an oral formulation of the same antibiotic or an appropriate alternative choice of antibiotic - refer to the Micro sensitivity reports.

Prescribers must bear in mind that the empirical choice of IV or oral antibiotic may be affected by the Microbiology results therefore the choice of treatment may need to be modified accordingly.

Narrow-spectrum antibiotics are preferred to the broad-spectrum group of antibiotics, when Microbiology sensitivity results are known.

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The following table provides a guideline for common oral "switches" but always check the Microbiology lab results and current Antibiotic Policy before the switch as the choice is dependent upon the site of infection and the sensitivities. The recommended dosages are for patients with normal renal and hepatic functions:

IV	ORAL
Amoxicillin	Amoxicillin 500mg – 1g TDS
Benzylpenicillin	For skin and soft tissues infections: high doses of flucloxacillin 500mg - 1g QDS alone For other conditions – Consult Microbiologists
Co-amoxiclav	Co-amoxiclav 375 - 625mg TDS
Clarithromycin	Clarithromycin 500mg BD
Metronidazole	Metronidazole 400mg TDS
IV antibiotics for surgical prophylaxis → usually appropriate to stop without changing to oral therapy for clean or clean-contaminated surgeries if without post-operative complications	

IV	ORAL
Flucloxacillin	Flucloxacillin 500mg – 1g QDS
Gentamicin	Ciprofloxacin 500mg BD, (or 750mg BD if Pseudomonal spp isolated)
Ciprofloxacin 200mg BD 400mg BD	Ciprofloxacin 250-500mg BD Ciprofloxacin 500mg BD, (or 750mg BD if Pseudomonal spp isolated)
Piperacillin / tazobactam	Seek Microbiologist advice
Teicoplanin	Seek Microbiologist advice
Vancomycin	Seek Microbiologist advice. N.B. Oral Vancomycin is **NOT** indicated for systemic infection as not absorbed from gut

3.5.4. Indications for Continuing IV Antibiotic Therapy

Prolonged IV duration is clinically indicated in **Specific High-Risk Infections**: Examples:

Meningitis	Infective Endocarditis
Septicaemia	Febrile with neutropenia / neutropenic sepsis
Infected implants/prostheses	Exacerbation of cystic fibrosis
Intracranial abscess/infection	*Deep abscess and empyema
Mediastinitis	*Liver abscess
Severe or necrotising soft tissue infection (including severe cellulitis)	*Septic arthritis
	*Osteomyelitis

* For **osteomyelitis, septic arthritis, adequately drained abscess or empyema, and liver abscess**, the IV antibiotic course may be switched to oral therapy after the **initial two weeks of IV therapy** to complete the prolonged course of treatment, if clinically improving. Please discuss with a Microbiologist for prolonged IV course or

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advice on the oral switch.

For immunocompromised patients and those on long term immunosuppressant therapy –
decision on IV duration is based upon patient's immune status and clinical response.

Continuing sepsis with no clinical improvement or deteriorating conditions on IV therapy as judged by the following infection indicators: -

- Body temp
- Blood pressure
- WBC
- Heart rate
- Respiratory rate
- CRP

Requires a senior clinical review and Microbiologist advice on choice of antibiotics.

Oral route compromised with no other alternative route for administration e.g. NG tube, PEG

3.5.5. Oral Route is Preferred

A number of antibiotics have **GOOD** oral bioavailability that are comparable to their IV formulation. Therefore, oral formulation is preferred to IV when oral route is not compromised, e.g.

- Clindamycin
- Co-trimoxazole
- Fluconazole
- Metronidazole
- Quinolones e.g ciprofloxacin, levofloxacin
- Rifampicin
- Sodium fusidate

} Must **NOT** be used alone due to rapid emergence of resistance.

N.B. Avoid using sodium fusidate IV if possible as likely to cause LFT disturbances.

Many antibiotics are available in liquid formulation. A pharmacist can advise on an alternative route of oral administration if necessary.

The overall decision for the "Oral Switch" is based upon clinician's clinical judgment on patient's clinical conditions.
Please contact the Microbiologist for further advice and guidance.

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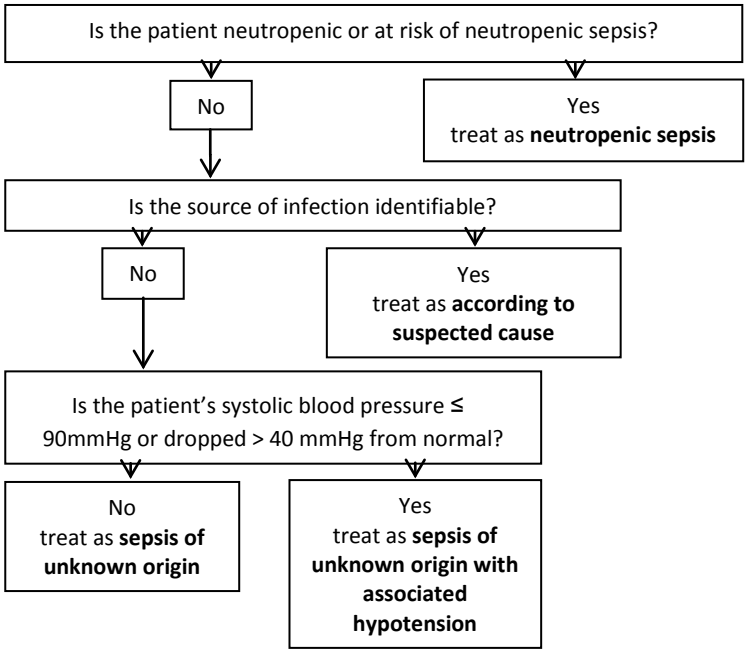
3.6. Sepsis

Sepsis is defined as 'a life-threatening organ dysfunction due to a dysregulated host response to infection'.

Patients who have been identified as being at risk of having sepsis should be screened for the presence of any ONE high risk, Red Flag Sepsis criterion. These are:

- Responds only to voice or pain/ unresponsive
- Systolic blood pressure ≤ 90mmHg (or drop > 40 mmHg from normal)
- Heart rate > 130 beats per minute
- Respiratory rate ≥ 25 per minute
- Needs oxygen to keep SpO_2 ≥ 92% (or 88% in COPD)
- Non-blanching rash, mottled/ ashen/ cyanotic
- Not passed urine in last 18 hours
- Urine output less than 0.5mL/kg/hr
- Lactate ≥ 2 mmol/L
- Known neutropeania or at risk of neutropenia (e.g. recent chemotherapy)

Any patient who looks unwell with presumed infection and who displays at least one Red Flag Sepsis criterion has Red Flag Sepsis and should immediately be placed on the Sepsis Six Pathway and appropriate antibiotics started within ONE hour of arrival or recognition:



- Patients with neutropenic sepsis or those patients who are immunosuppressed with sepsis should be treated with the antibiotics stipulated in the: **"Immuno-suppressed / neutropenic sepsis pathway" (section 3.6.3).**
- Patients with a clear source of infection should be treated with the antibiotics **specified for the indication**. **See section 3.6.4: Sepsis with identifiable**

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source.

- Patients with an unclear source of infection should initially be treated with the antibiotics stipulated in the **"Sepsis Initial empiric therapy for unknown origin" pathway (section 3.6.1).**
- Patients with
  - an unclear source of infection AND a:
  - Systolic blood pressure ≤ 90mmHg (or drop > 40 mmHg from normal)

  should initially be treated with the antibiotics stipulated in the **"Sepsis with associated hypotension: Initial empiric therapy for unknown origin" pathway" (section 3.6.2).**

The patient MUST be reviewed within SIX hours of treatment initiation and antibiotic therapy rationalised according to patient response and available diagnostic results.

Ensure that the initial selection of antibiotics takes into account relevant previous microbiology resistance history.

Assess immune status, search for focus of infection, take blood culture, MSU, stool culture and throat swab prior to starting therapy.

A single set (2 bottles) taken at any one time is sufficient to identify culture positive cases. In the event of suspected bacterial endocarditis three sets are recommended but should be taken from different sites at different times and not inoculated from the same specimen. In the event of septicaemia involving possible sepsis from a central line two sets should be inoculated; one set from blood taken through the central line and the other from a peripheral vein.

3.6.1. Sepsis of Unknown Origin: Initial Empiric Treatment:

Infections	Recommended Treatment	Alternative
Sepsis: Initial empiric therapy for unknown origin **SEE BELOW IF NEUTROPENIC SEPSIS OR Sepsis with associated hypotension IS SUSPECTED**	Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23**	For Penicillin allergy: Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after

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	PLUS Amoxicillin IV 1g TDS PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours) **See boxes/sections below for further advice.** IF MRSA is of concern: • Add Vancomycin IV Target pre-dose level = 10-15mg/L – See Section 3.21	the initial dose. **See single treatment and once daily dosing guidance – section 3.23** PLUS Teicoplanin IV 600mg 12 hourly for 3 doses then OD PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours) ***Contact Micro/ID for advice once the above have been initiated to discuss on further treatment plan.***
Review patient at least daily. Once a source of infection has been identified please refer to the appropriate section below for specific de-escalation and oral options were appropriate.		

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3.6.2. Sepsis of Unknown Origin with associated hypotension: Initial Empiric Treatment

Infections	Recommended Treatment	Alternative
Sepsis with associated hypotension: Initial empiric therapy for unknown origin **To be used in patients who have: Systolic blood pressure ≤ 90mmHg OR drop > 40 mmHg from normal.**	Meropenem IV 1g TDS A carbapenem should only be continued after discussion with a Consultant Microbiologist / ID Physician	For penicillin allergy with history of true anaphylaxis: Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23** PLUS Teicoplanin IV 600mg 12 hourly for 3 doses then OD, PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours *Contact Micro/ID for advice once the above have been initiated to discuss on further treatment plan*
If infection suspected to be Central / Long line associated	Add: Teicoplanin IV 600mg 12 hourly for 3 doses then OD if not already included in the regimen.	
Review patient at least daily. Once a source of infection has been identified please refer to the appropriate section below for specific de-escalation and oral options were appropriate.		

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3.6.3. Neutropenic Sepsis

Infections	Recommended Treatment	Alternative
Immuno-suppressed / neutropenic sepsis ***Refer to Document CPME172 for more detailed management*** ***(See flow chart below)***	Piperacillin / tazobactam IV 4.5g TDS If not available use: Meropenem IV 1g TDS A carbapenem should only be continued after discussion with a Consultant Microbiologist / ID Physician	For Penicillin allergy but not anaphylaxis and/or history of resistant Gram negative organisms eg. ESBL, AmpC or resistant to Piperacillin/tazobactam: Meropenem IV 1g TDS A carbapenem should only be continued after discussion with a Consultant Microbiologist / ID Physician For Penicillin allergy with history of true anaphylaxis: Aztreonam 2g IV TDS PLUS Teicoplanin IV 600mg 12 hourly for 3 doses then OD, PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours) If aztreonam not available and patient is NOT on ciprofloxacin prophylaxis: Ciprofloxacin IV 400mg TDS (change to ciprofloxacin PO 750mg BD within 24 hours) (caution in epilepsy) PLUS Teicoplanin IV 600mg 12 hourly for 3 doses then OD, PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours If aztreonam not available and patient IS on ciprofloxacin prophylaxis and patient has NOT had vinca alkaloids: Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further

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		doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23** PLUS Teicoplanin IV 600mg 12 hourly for 3 doses then OD, PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours *Contact Micro/ID for advice once the above have been initiated to discuss on further treatment plan.*
If infection suspected to be Central / Long line associated	Add: Teicoplanin IV 600mg 12 hourly for 3 doses then OD if not already included in the regimen.	
Oral Therapy	Co-amoxiclav PO 625mg TDS OR Ciprofloxacin PO 500mg BD (or according to sensitivity results) (caution in epilepsy)	Consult Microbiologist or Haematologist for advice

Patients should be appropriately screened to determine if they are at risk of colonisation with, or an infection due to carbapenemase producing enterobacteriaceae.
If the patient is identified as being at risk advice regarding appropriate treatment should be sought from microbiology and the patient managed in accordance with the Policy for the Management and Control of Carbapenemase Producing Enterobacteriaceae (CPE).

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3.6.4. Sepsis with identifiable source:

Infections	Recommended Treatment	Alternative
In severe abdominal/ pelvic sepsis **Common Organisms Gram negative bacilli Anaerobes and faecal Streptococci**	See section 3.10.5	See section 3.10.5
Urological sepsis/ pyelonephritis	See section 3.11.2	See section 3.11.2
Biliary / Abdominal Sepsis	See section 3.10.4	See section 3.10.4
Soft Tissue Infection	See sections 3.16 and 3.17	See sections 3.16 and 3.17
Respiratory	See section 3.13	See section 3.13

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Management of Infection in Neutropenic Patients at Pennine Acute Hosptials NHS Trust (Refer to CPME172 for full management details)

Suspect an infection in patients with:

Pyrexia:
>38°C on a single reading,
or
37.7°C on two occasions,
1 hour apart.

Neutrophil Count:

<$0.5x10^9$/L or less than $1.0x10^9$/L and falling

Symptoms:
Unexplainably unwell, or
Rigors, Hypotension, Confusion, or
Unexplained nausea and vomiting even in the absence of pyrexia

Investigation Required: -
1. Full history and examination
2. FBC. Kidney and liver function tests including CRP and lactate
3. Blood taken from peripheral vein and central line (if present) for bacterial and fungal cultures

This is a medical emergency and antibiotic therapy should be offered immediately

FIRST LINE:
Piperacillin/tazobactam IV 4.5g TDS

If not available:
Meropenem IV 1g TDS

SECOND LINE:
Penicillin allergy but not anaphylaxis and/or history of resistant Gram negative organisms eg. ESBL, AmpC or resistant to piperacillin/tazobactam

Meropenem IV 1g TDS

Penicillin allergy with history of true anaphylaxis:-

Aztreonam 2g IV TDS
PLUS
Teicoplanin IV 600mg 12 hourly for 3 doses then OD,
PLUS
Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours)

If Aztreonam is not available please refere to full antibiotic policy

Contact Micro/ID for advice once the above have been initiated to discuss on further treatment plan.

If there is suspicion of MRSA or line related sepsis, add **Vancomycin** IV, if not already on a glycopepetide, dosage to be modified according to renal function and level monitoring is required (see **section 3.21**)

Amend antibiotics according to culture and sensitivity reports
After initial 24-48 hour management contact consultant haematologist for further management and advice

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3.7. Central Nervous System Infections

3.7.1. Meningitis

Healthcare workers should reduce the possibility of exposure to large particle droplets (e.g. by wearing surgical masks, using closed suction) especially when carrying out airway management procedures, so that chemoprophylaxis is not needed.

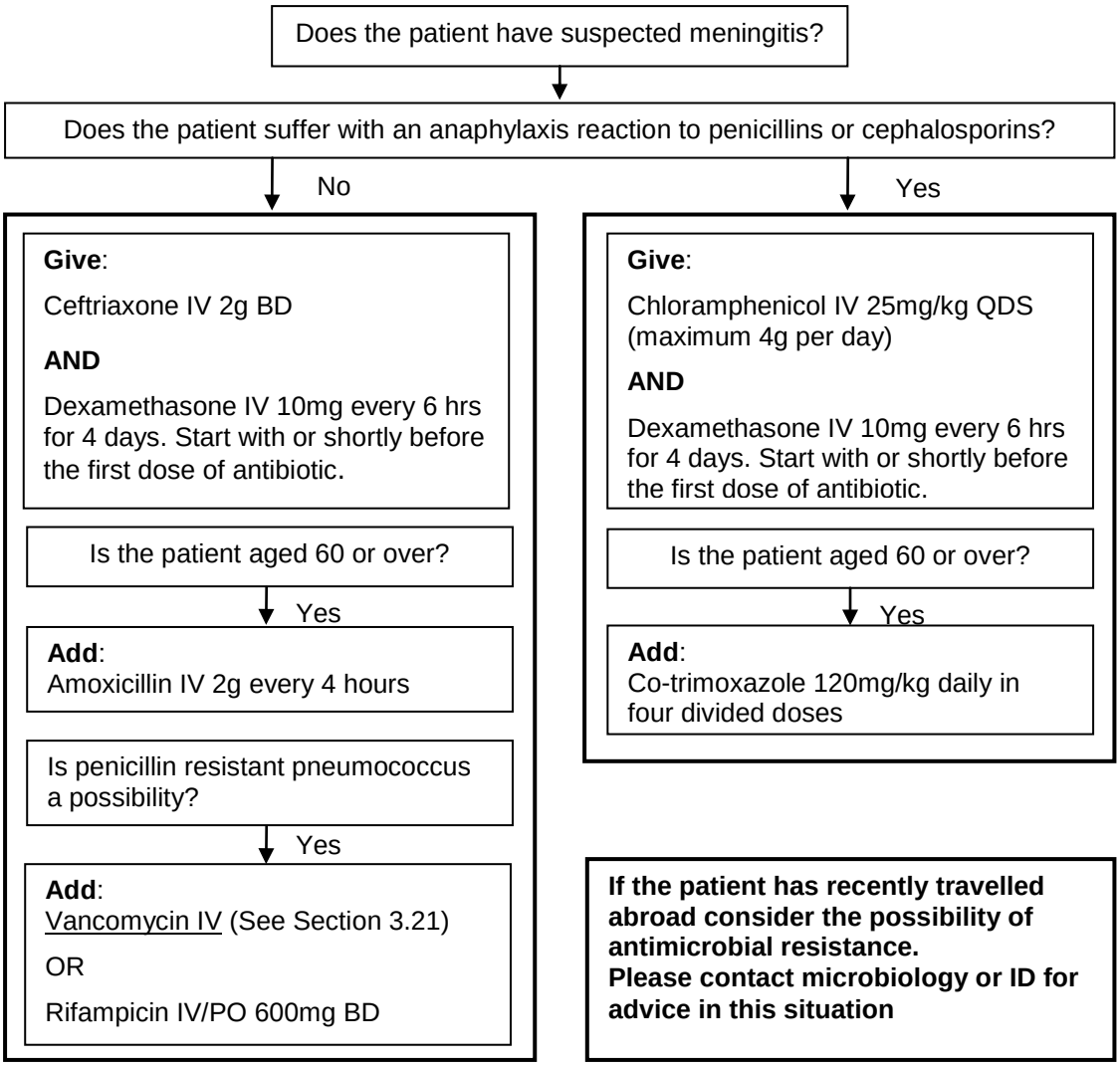
Take throat swab, blood culture and CSF (if lumbar puncture can be safely done). EDTA blood specimen for PCR if meningococcal meningitis suspected.

The likely infecting organisms in adults/older children are Pneumococcus or Meningococcus.

The incidence of Haemophilus meningitis is now low due to HIB vaccination in the childhood vaccination program.

Inform Public Health Doctor on call if meningococcal meningitis/septicaemia suspected.

Empiric treatment for all patients with suspected meningitis or meningococcal sepsis:



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Treatment should be modified once results become available (see below)
Treatment modification when results available:

Causative Bacteria	Recommended Treatment	Alternative for penicillin allergy
Meningococcus	Ceftriaxone* IV 2g BD OR Benzylpenicillin* IV 2.4g 4 hourly in severe cases. Treat for at least 7 days *Add Dexamethasone IV 10mg every 6 hrs for 4 days. Start with or shortly before the first dose of antibiotic. Discontinue if not pneumococcal meningitis. Give Ciprofloxacin PO 500mg STAT (caution in epilepsy) to eliminate nasopharyngeal carriage if patients **NOT** treated with Ceftriaxone.	Chloramphenicol IV 12.5-25mg/kg every 6 hours. Max of 4g/day **DISCUSS WITH MICROBIOLOGIST OR ID BEFORE INITIATING TREATMENT**
Pneumococcus	Ceftriaxone* IV 2g BD Treat for 10 – 14 days *Add Dexamethasone IV 10mg every 6 hrs for 4 days. Start with or shortly before the first dose of antibiotic. Substitute Benzylpenicillin if organism is highly penicillin-sensitive. Add Vancomycin IV (See Section 3.21) and if necessary, Rifampicin for highly penicillin - and cephalosporin resistant – Discuss with Microbiologist / ID	
Haemophilus Influenzae	Ceftriaxone* IV 2g BD *Add Dexamethasone IV 10mg every 6 hrs for 4 days. Start with or shortly before the first dose of antibiotic. Discontinue if not pneumococcal meningitis.	
Listeria	Refer to Microbiologist or ID physician for advice	

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Reference: http://www.journalofinfection.com/article/S0163-4453(16)00024-4/fulltext

3.7.2. Prophylaxis for close contacts of Meningococcal Disease

Ref: http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1194947389261

Prophylaxis should be given to all close/household contacts of the patient. It is important that all family members should have prophylaxis at the same time.

Chemoprophylaxis for health care workers is recommended **only** for those whose mouth or nose is directly exposed to large particle droplets/secretions from the respiratory tract of a probable or confirmed case of meningococcal disease during acute illness until completed 24 hours of systemic antibiotics.

This type of exposure will only occur among staff who are working close to the face of the case without wearing a mask or other mechanical protection. In practice this implies a clear perception of facial contact with droplets/secretions and is unlikely to occur unless using suction during airway management, inserting an airway, intubating, or if the patient coughs in your face. General medical or nursing care of cases is **not** an indication for prophylaxis. Further advice is available from microbiology/infection control as required.

Ciprofloxacin is the prophylactic agent of choice for all ages and in pregnancy, but is contraindicated in patients with known hypersensitivity to ciprofloxacin and should be used with caution in epilepsy. Rifampicin can be used as an alternative.

First Line for all age group & pregnancy:

Ciprofloxacin	**Dosage**
Adults and children over 12 years	500mg PO STAT
Children aged 5-12 years	250mg PO STAT
Children 1 month to 4 years	30 mg/kg (maximum 125 mg) PO STAT

It is the responsibility of the prescriber to supply written information for patients receiving this prescription. An information sheet can be downloaded from this link: Patient Info Leaflet Ciprofloxacin

Alternative:

For pregnant women	Ceftriaxone IM 250mg STAT (dissolve in 3.5ml of 1% lidocaine HCL)

Rifampicin	**Dosage**
Adults and children over 12 years	600mg PO BD for 2 days
Children aged 1-12 years	10mg/kg (maximum 600mg per dose) PO BD for 2 days
Infants under 12 months	5mg /kg PO BD for 2 days

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It is the responsibility of the prescriber to supply written information for patients receiving this prescription. An information sheet can be downloaded from this link: Patient Info Leaflet Rifampicin

3.7.3. Brain Abscess

Take blood culture, ear swab and throat swab. Therapy may have to be modified based on infective source, intracerebral location of the abscess and culture result.

If post-trauma, post surgical, discuss with Microbiologist

Common causative organisms: streptococci/staphylococci, Anaerobes and intestinal aerobes
Post surgical: Coliform/Pseudomonas

Comments	Recommended Treatment	Alternative
	Ceftriaxone IV 2g BD PLUS Metronidazole IV 500mg TDS PLUS Flucloxacillin IV 1g QDS	Discuss with Microbiologist or ID
For patients with concurrent GI infections:	Add Amoxicillin IV 2g QDS	

3.7.4. Herpes Encephalitis (HSV and VZV)

Recommended Treatment:

- Aciclovir IV10mg/kg every eight hours

To avoid excessive dosage in obese patients parenteral dose should be calculated on the basis of ideal weight for height.

Aciclovir is **not** recommended for the treatment of viral meningitis including HSV, VZV and enterovirus.

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3.8. Bone and Joint Infections

3.8.1. Joint Infections:

Please send aspirate or biopsy specimen if possible. Blood cultures are useful in acute infection. For post-traumatic, post-operative, vertebral, implant-associated, in complicated haemoglobinopathy or when dealing with chronic or unusual infection, discuss with Microbiologist.

Likely causative pathogens: Staphylococcus aureus and Haemolytic streptoccocus Refer to Early Management of the Acute Hot Joint Policy - CPME054 for further information.

Many hot joints will have a non-infective cause, e.g. gout or rheumatoid arthritis flare up, and antibiotics will not be necessary in these cases.

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<table>
<tr><th>Infections</th><th>Recommended Treatment</th><th>Alternative</th><th>Treatment Duration</th></tr>
<tr><td rowspan="2">Hot Joint where infection is thought to be likely,
or
Septic Arthritis</td><td>Flucloxacillin IV 2g QDS

OR: for patients previously/ currently colonised with MRSA
<u>Vancomycin</u> IV – dosage refer to section 3.21, Vancomyin dosing and level monitoring guidelines. Target pre-dose level = 10-15mg/L</td><td><u>Vancomycin</u> IV – refer to section 3.21, Vancomyin dosing and level monitoring guidelines. Target pre-dose level = 10-15mg/L</td><td rowspan="2">Length of IV therapy and total treatment duration depend on the definitive diagnosis and clinical response. Please liaise with Micro</td></tr>
<tr><td>If high risk of Gram negative sepsis e.g. elderly, frail, urinary or abdominal focus

ADD
Co-amoxiclav IV 1.2g TDS</td><td>If high risk of Gram negative sepsis e.g. elderly, frail, urinary or abdominal focus

ADD
<u>Gentamicin</u> IV:
5mg/kg if GFR >30 mL/min
3mg/kg if GFR 10 to 30 mL/min
if GFR less than 10 mL/min contact microbiology for advice.
Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given at least 24 hours after the initial dose.
<u>See single treatment and once daily dosing guidance – section 3.23</u></td></tr>
<tr><td colspan="4">Comments: Modify treatment choices according to the infecting organisms. Discuss with Microbiologist / ID regarding treatment duration and oral choices.</td></tr>
</table>

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3.8.2. Bone infections:

Please send aspirate or biopsy specimen if possible. Blood cultures are useful in acute infection. For post-traumatic, post-operative, vertebral, implant-associated, in complicated haemoglobinopathy or when dealing with chronic or unusual infection, discuss with Microbiologist.

Likely infecting organisms:-

ADULT: Staphylococcus, Streptococci, Coliform, Pseudomonas, Tuberculosis, Neisseria spp.

Infections	Recommended Treatment	Alternative	Treatment Duration
Osteomyelitis	Flucloxacillin IV 1-2 g QDS PLUS Sodium Fusidate PO 500mg TDS (or 750mg TDS in liquid)	Teicoplanin 12 mg/kg every 12 hours for 3 doses, then 12 mg/kg once daily PLUS Sodium Fusidate PO 500mg TDS (or 750mg TDS in liquid)	Intravenous therapy should be continued for up to 14 days, then switch to oral therapy. Total treatment duration should be at least 6-12 weeks for osteomyelitis.
Oral Therapy	Flucloxacillin PO 500mg – 1g QDS PLUS Sodium Fusidate PO 500mg TDS (or 750mg TDS in liquid)	Clindamycin PO 300-450mg QDS PLUS Sodium Fusidate PO 500mg TDS (or 750mg TDS in liquid)	
Comments	Modify treatment choices according to the infecting organisms. Discuss with Microbiologist regarding treatment duration and oral choices.		

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3.9. Eye, Ear, Nose and Throat (ENT) and Oral Infections:

Infections	Recommended Treatment	Alternative
Purulent Conjunctivitis	Chloramphenicol 0.5% eye drops or 1% eye ointment every 4-6 hours, continuing for 3 days after symptoms have resolved	Fusidic Acid (Fucithalmic®) eye drops, 1 drop BD
Orbital Cellulitis Commonest causative organism : Haemophilus Influenzae, Staph. Aureus	Ceftriaxone IV 2g OD PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours) PLUS Flucloxacillin IV 1g QDS	
Otitis Media Acute	Amoxicillin PO 500mg TDS for 5 days	Clarithromycin PO 500mg BD for 5 days
Otitis Media Chronic	Co-amoxiclav PO 625mg TDS for 7 days	Doxycycline 200mg STAT then 100mg OD PLUS Metronidazole PO 400mg TDS Treat for 7 days
Otitis externa	Gentisone HC Ear Drops, Instil 3 drops 3-4 times daily and at night OR Sofradex Ear Drops, Instil 3 drops 3-4 times daily OR Otomize Spray, 1 metered spray TDS for 10 days	Flucloxacillin PO 500mg QDS for 5 days
Malignant Otitis Externa Commonest causative organism: Pseudomonal spp.	Ceftazidime IV 1-2g TDS OR Ciprofloxacin PO 750mg BD (or IV 400mg BD if oral route is contraindicated) (caution in epilepsy)	Consult Microbiologist or ENT Consultants

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Infections	Recommended Treatment	Alternative
Discharging Ear	Aural toilet required with astringent preparation. Topical agent may be needed. Consult ENT Consultants.	
Sinusitis (Acute and Chronic)	Treat as **Otitis Media**	
Sore Throat	Most cases are of viral aetiology. If, however, the onset is dramatic with high temperature, bacteriological investigations are indicated. Take swab exudates of pus from the inflamed area.	
Streptococcal Tonsillitis	Phenoxymethylpenicillin PO 500mg QDS for 10 days	Clarithromycin PO 500mg BD
Severe Tonsillitis	Benzylpenicillin IV 1.2g QDS	Clarithromycin IV 500mg BD
Epiglottitis	Ceftriaxone IV 2g OD	Discuss with Microbiologist
Dental abscess/ gingivitis	Amoxicillin PO 500mg TDS PLUS metronidazole PO 400mg TDS for 7 days	Clindamycin PO 300 – 450mg QDS for 7 days
Oral candidiasis	Fluconazole PO 50mg OD for 7-14 days	Nystatin oral Suspension 100,000 units (1mL) QDS for 7-14 days. Swill round the mouth for 1 min then swallow. This is a second line choice and should only be used if it is inappropriate to use fluconazole.
Angular Cheilitis	Miconazole oral gel, 5ml QDS for at least 2 weeks or until all clinical signs and symptoms have resolved	Discuss with Microbiologist

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3.10. Gastrointestinal Infections:

Obtain faecal samples for cultures.

- Report previous antibiotic use or travel history on request card.
- Enteric precaution might be indicated. Please inform/discuss with Infection Control Team

3.10.1. Gastroenteritis:

Antibiotics are usually not indicated.
Many cases are viral in origin. Viral cultures are occasionally required.

Infections	Recommended Treatment	Comments
Campylobacter Enteritis	First line: Clarithromycin PO 500 mg BD OR Second line: Ciprofloxacin PO 500mg BD Discuss with Microbiologist / ID	For 5 DAYS Treatment is not always indicated. Contact Microbiologist or ID if in doubt. Avoid Ciprofloxacin in pregnancy & children, use with caution in epilepsy
Salmonella Infection (food poisoning)	Ciprofloxacin PO 500mg BD In severe infection, Ciprofloxacin IV 400mg BD may be indicated if patient vomits. Change to oral as soon as feasible	
Typhoid/fever paratyphoid	Ceftriaxone IV 2g OD to BD **BUT** discuss with Microbiologist or ID before starting therapy	
Pathogenic E Coli Traveller's diarrhoea Aeromonas spp.	Antibiotic not usually indicated Contact Microbiologist or ID if in doubt.	
Cryptosporidium	Self-limiting. No effective antibiotic available	
Giardiasis	Metronidazole PO 400 mg TDS	Discuss with Microbiologist or ID before starting therapy
Amoebiasis	Metronidazole PO 400mg TDS followed by Diloxanide Furoate PO 500 mg TDS	Discuss with Microbiologist or ID before starting therapy
Intestinal Parasites	Discuss with Consultant Microbiologist or ID	

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3.10.2. Clostridium Difficile Infection:

Though **no antibiotic is exempt,** the common high risk antibiotics for causing *C. difficile* infections (CDI) are **cephalosporins, clindamycin**, **co-amoxiclav** and **quinolones.**

Please also see Clotridium difficile Policy CPDI008.

Diarrhoea and one of the followings:
Positive *C. difficile* Toxin test **or** Pending Toxin Test Result and clinical suspicion of CDI

- **STOP** all antibiotics if clinically possible or switch to a low-risk alternative for causing CDI, i.e. narrow spectrum antibiotics.
- All anti-motility agents should be **STOPPED.**
- **Proton Pump Inhibitors (PPI)** must be reviewed and suspended or switched to ranitidine for patients at high risk of GI bleed
- **Isolate**
- Complete **disease severity assessment** for *Clostridium difficile* infection and document
- Consider **GI/surgical review**

Disease Severity Assessment

Severe disease: One or more of the following indicate severe disease:
- Fever ≥ 38.5°C
- WBC ≥ 15 X 10^9/L
- Creatinine (50% increase from baseline) / new oliguira
- Evidence of severe colitis

Life threatening disease: Features of severe disease plus one or more of:
- Ileus or toxic megacolon
- Hypotension

Other features that may suggest severe or life threatening CDI include:
- Abdominal pain
- Abdominal distension
- CRP > 50mg/L
- Albumin < 25g/L
- Serum lactate > 5 mmol/L is associated with extremely poor prognosis

1st line treatment:
Vancomycin oral 125mg QDS for 10-14 days
(The contents of vials for parenteral administration may be used for oral administration for inpatients – see below)

If the oral route is not appropriate use:
Metronidazole IV 500mg TDS
NB: Parenteral administration of vancomycin is not effective for *C. difficile*

For 1st CDI recurrence and on Micro/ID advice only: Fidaxomicin PO 200mg BD for 10 days

For life threatening or non-responding cases discuss with Micro/ID and consider: -
Vancomycin oral 250-500mg QDS +/- Metronidazole IV 500mg TDS for 10-14 days, OR
Add Rifampicin PO 300mg BD, OR
Add IV Immunoglobulin 400mg/kg STAT *(Panel approval required)*
Urgent GI and surgical review if not already done

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*Please note that Vancomycin powder for solution is licensed for administration orally or via an enteral tube.

For 125mg dose regimen:-

- Reconstitute a 1**g-**vial with 20ml of water for injection to give a 50mg/ml solution.
- Take 2.5 ml of the reconstituted solution and further dilute with 30ml water for injection to give a 125mg dose.
- The remaining reconstituted concentrate solution must be stored in the fridge and has an expiry of 96 hours. Each vial provides EIGHT doses and will provide treatment for TWO days.

For 250 mg dosage regimen:-

- Reconstitute a **1g-**vial with 20ml of water for injection to give a 50mg/ml solution.
- Take 5ml of the reconstituted solution and further dilute with 30ml water for injection to give a 250mg dose.
- The remaining reconstituted concentrate solution must be stored in the fridge and has an expiry of 96 hours. Each vial provides FOUR doses and will provide treatment for ONE day.

For 500 mg dosage regimen:-

- Reconstitute a **1g-**vial with 20ml of water for injection to give a 50mg/ml solution.
- Take 10ml of the reconstituted solution and further dilute with 30ml water for injection to give a 500mg dose.
- The remaining reconstituted concentrate solution must be stored in the fridge and has an expiry of 96 hours. Each vial provides TWO doses.

3.10.3. H. Pylori Eradication Regimen

Recommended Treatment	Alternative
Amoxicillin PO 1g BD PLUS Clarithromycin PO 500mg BD PLUS Omeprazole PO 20mg BD For 7 days	Metronidazole PO 400mg BD PLUS Clarithromycin PO 500mg BD PLUS Omeprazole PO 20mg BD For 7 days

Discuss with Consultant Gastroenterologist for further advice if necessary.

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3.10.4. Biliary Tract / GI Tract Associated Infections

Take blood culture, MSU, stool culture and pus (where possible) prior to treatment

Infections	Recommended treatment	Alternative
Cholecystitis / Cholangitis / Diverticulitis / Peri-rectal abscess	Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23** PLUS Amoxicillin IV 1g TDS PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours)	Ciprofloxacin PO 500mg BD (or IV if contraindicated to oral) (caution in epilepsy) PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours)
For severe unresponsive cases, or consult Microbiologist	Consult Microbiologist	
Switch to oral therapy if without contraindications and is clinically improving (Ref to IV-Oral Antibiotic Switch Guideline)	Co-Amoxiclav PO 625mg TDS OR Amoxicillin PO 1g TDS PLUS Metronidazole PO 400mg TDS according to the culture results	Ciprofloxacin PO 500mg-750mg BD (caution in epilepsy) PLUS Metronidazole PO 400mg TDS

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3.10.5. Intra-abdominal Infections

Take blood culture, MSU, stool culture and pus (where possible) prior to treatment.

Infections	Recommended treatment	Alternative
Liver, pelvic or abdominal abscess or faecal peritonitis	Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23** PLUS Amoxicillin IV 1g TDS PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours)	Vancomycin IV Target pre-dose level = 10-15mg/L – See Section 3.21 PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours) PLUS Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinicly indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23**
Switch to oral therapy if without contraindications and is clinically improving (Ref to IV-Oral Antibiotic Switch Guideline)	Co-amoxiclav PO 625mg TDS with or without Metronidazole PO 400mg TDS OR Amoxicillin PO 1g TDS PLUS Metronidazole PO 400mg TDS according to the culture results	Ciprofloxacin PO 500mg-750mg BD (caution in epilepsy) PLUS Metronidazole PO 400mg TDS

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3.11. Urinary Tract Infections

Take an MSU before initiating treatment. Take a blood culture if suspecting pyelonephritis, abscess or septicaemia.

If previous sensitivities are known ensure that these are taken into account when selecting treatment option.

3.11.1. Uncomplicated Lower UTI / Cystitis:

Infection in a structurally and neurologically normal urinary tract when no fever or flank pain present**.** Therapy should be directed by the susceptibility testing results where possible.

Recommended Treatment 1st line	**Note**	**Treatment Duration**
Nitrofurantoin PO 50mg QDS (avoid if early pyelonephritis suspected)	Avoid in patients with suspected or known glucose-6-phosphate dehydrogenase (G-6-PD) deficiency. Avoid if eGFR <45ml/min	Women (not pregnant) 3 days Men 7 days Catheterised patients 7 days
Alternative Treatments		
Trimethoprim PO 200mg BD	High level of local resistance is present **Only prescribe when sensitivity is known**	As above
Pivmecillinam PO 400mg then 200mg TDS	Do not use in patients with penicillin allergy **Only prescribe when sensitivity is known**	As above
Fosfomycin PO	Use when resistant bacteria (e.g. ESBL) identified in urine. **Discuss with microbiology**	Women 3 g for 1 dose. Men 3 g for 1 dose, then 3 g after 3 days.

Recommended treatment during pregnancy			
1st line	Nitrofurantoin PO 50mg QDS	Do not use in 3rd trimester	Pregnant women 7 days
2nd line	Trimethoprim PO 200mg BD	Do not use in 1st trimester	
3rd line	Cefalexin PO 500mg TDS	Safe for use in pregnancy	
Asymptomatic bacteruria of pregnancy			
Two urine samples are required to confirm this diagnosis.	Treatment is based on sensitivity testing results as above. Periodic screening for recurrent bacteriuria should be undertaken after therapy. **Refer to Obs & Gynae for follow up.**		

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3.11.2. Pyelonephritis or urological sepsis:

Inflammation of the kidney and upper urinary tract that usually results from noncontagious bacterial infection of the bladder.

Presentation: High fever, rigors, loin pain, nausea, vomiting, diarrhoea, symptoms of lower UTI may also be present.
NB: Symptoms can be minimal or absent in some patients eg. in diabetes, immunocompromised patients, pregnancy, alcohol dependence.

Patients with pyelonephritis commonly have the bacterial cause identified in urine or blood cultures. Oral therapy should be directed by the susceptibility testing results where possible.

If previous sensitivities are known ensure that these are taken into account when selecting treatment option.

If significant improvement in 24 hours of diagnosis please reassess patient and diagnosis – unlikely to be pyelonephritis and more likely to be urinary tract infection.

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<table>
<tr><th></th><th>Recommended Treatment</th><th>Alternative Treatments</th><th>Treatment Duration</th></tr>
<tr><td rowspan="2">Initial IV therapy</td><td><u>Gentamicin</u> IV:
5mg/kg if GFR >30 mL/min
3mg/kg if GFR 10 to 30 mL/min
if GFR less than 10 mL/min contact microbiology for advice.
Dose based on ideal body weight max 480mg round to nearest 40mg.
Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given at least 24 hours after the initial dose.
See single treatment and once daily dosing guidance – <u>section 3.23</u></td><td>Ciprofloxacin IV 400mg BD or PO 500mg BD

(If IV initially used change to ciprofloxacin PO within 24 hours)

(avoid in pregnancy; caution in epilepsy)</td><td rowspan="4">7 days total with ciprofloxacin therapy

14 days total with non-ciprofloxacin therapy

Gentamicin duration: stop when sensitivities known or clinical improvement.</td></tr>
<tr><td colspan="2">Avoid ciprofloxacin use in patients over 65yrs where possible as higher risk of C.diff infection</td></tr>
<tr><td>Initial oral therapy</td><td colspan="2">1st line: Ciprofloxacin 500mg BD
2nd line: Co-amoxiclav 625mg TDS</td></tr>
<tr><td>Oral therapy following improvement on IV therapy.</td><td colspan="2">Oral therapy should be directed by the susceptibility testing results where possible
Pivmecillinam 400mg TDS
Ciprofloxacin 500mg BD
Co-amoxiclav 625mg TDS
Trimethoprim 200mg BD
Note: Nitrofurantoin and fosfomycin NOT to be used in pyelonephritis.

Use ciprofloxacin with caution in epilepsy.</td></tr>
<tr><td colspan="4">Recommended treatment during pregnancy</td></tr>
<tr><td>Initial IV therapy</td><td colspan="2">Cefuroxime IV 1.5g TDS</td><td rowspan="2">Total Duration 14 days</td></tr>
<tr><td>Oral step-down</td><td colspan="2">Cefalexin 500mg TDS
or as per sensitivities</td></tr>
</table>

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3.11.3. Catheter-Associated Infection

In a short-term catheter (e.g. catheterisation to relieve retention arising from infection), suggest removal of the catheter after 48 hours of antimicrobial therapy (if clinically feasible).

Bacteriuria is inevitable in the long-term catheterised. Attempts at eradication of bacteriuria by antimicrobials will lead to colonisation with more resistant organisms. Therefore antimicrobial therapy should be reserved for cases of clinical infection e.g. those with fever, leucocytosis and abdominal pain.

In asymptomatic patients with a free flowing catheter, antibiotics are NOT recommended.

If previous sensitivities are known ensure that these are taken into account when selecting treatment option.

Recommended Treatment	**Dose**	**Treatment Duration**
Lower Urinary tract		
Nitrofurantoin	PO 50mg QDS Avoid in patients with suspected or known glucose-6-phosphate dehydrogenase (G-6-PD) deficiency. Avoid if eGFR <45ml/min	7 days
Patients with UTI associated with catheters commonly have the bacterial cause identified in urine cultures. **Antimicrobial therapy should always be directed by the susceptibility testing results where possible.**		

Alternative treatments: Treat as per sensitivities			
Drug	**Note**	**Dose**	**Duration**
Pivmecillinam	-	PO 400mg TDS	7 days
Fosfomycin	Use when resistant bacteria (e.g. ESBL) identified in urine.	PO 3g repeated every 3 days	1-3 doses
Ciprofloxacin	Pseudomonas identified in urine culture.	PO 500mg BD (caution in epilepsy)	7 days
Trimethoprim	High level of local resistance is present **Only prescribe when sensitivity is known**	PO 200mg BD	7 days
Note: Shorter durations (3-6 days) can be used when urinary catheters are removed.			
Upper urinary tract catheter-associated infections: treat as per pyelonephritis guidelines			

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3.11.4. UTI in Males:

3.11.4.1. Cystitis and prostatitis

The presence of prostatic involvement complicates the management of UTI in males; if prostate infection is being treated a longer duration of antimicrobial therapy is needed. For practical purposes prostatic involvement can be considered likely where there is evidence of symptoms of UTI with fever or there is relapse of UTI after treatment i.e. the same bacterial species is isolated from urine samples. Most men with prostatic symptoms do not have an infective aetiology.

Clinical syndromes

- **Cystitis**: Dysuria and frequency only with no fever
  See 3.11.1 for treatment

- **Acute bacterial prostatitis**: fever, chills, and pain in the low back, rectum, or perineum with irritative or obstructive genitourinary symptoms. On examination the prostate is warm, firm, swollen, and tender.

- **Chronic bacterial prostatitis**: relapsing urinary tract infections, even after appropriate antibiotic therapy. Some men have dysuria or other voiding complaints, ejaculatory pain, hemospermia, or pelvic or genital pain, but others are asymptomatic.

Urine culture: urine cultures are normally positive in cystitis and prostatitis. Negative urine cultures should prompt a review of the diagnosis, see below.

Differential diagnosis
Many men with symptoms of prostatitis do NOT have an infection but either nonbacterial prostatitis or chronic pelvic pain syndrome.

If previous sensitivities are known ensure that these are taken into account when selecting treatment option.

	Recommended Treatment	Alternative Treatment	Treatment Duration
Urine culture results are often available before therapy is started, or by 48 hours after starting treatment. Therapy should be based on these results.			
Acute bacterial prostatitis	Ciprofloxacin PO 500mg BD (caution in epilepsy)	discuss with microbiology	4 weeks
Chronic Bacterial prostatitis	Ciprofloxacin PO 500mg BD (caution in epilepsy)	Trimethoprim PO 200mg BD	4 weeks

3.11.4.2. Epididymo-orchitis:

Acute epididymo-orchitis is a clinical syndrome consisting of pain, swelling and inflammation of the epididymis +/- testes.

Aetiology

- Under 35 years - most often a sexually transmitted pathogen such as Chlamydia trachomatis and Neisseria gonorrhoeae.

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- Over 35 years - most often non-sexually transmitted Gram negative enteric organisms causing urinary tract infections. Particular risks include recent instrumentation or catheterisation.
- There is crossover between these groups and complete sexual history taking is Imperative.

Investigations

- Urine culture and sensitivity
- Urine PCR testing for Neisseria gonnorhoea and Chlamydia trachomatis

ALL STI CASES MUST BE REFERRED TO GUM FOR SCREENING, TREATMENT AND CONTACT TRACING

	Recommended Treatment	**Alternative Treatment**
Sexually transmitted infection likely.	Ceftriaxone IM 500mg single dose PLUS Doxycycline PO 100mg BD for 10-14 days	discuss with microbiology
Enteric bacteria likely.	Ciprofloxacin 500mg PO BD for 14 days (caution in epilepsy)	discuss with microbiology
Severe epididymo-orchitis or features suggestive of bacteraemia.	Ciprofloxacin IV 400mg BD or PO 500mg BD (If IV initially used change to ciprofloxacin PO within 24 hours) (caution in epilepsy) + / - Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23**	discuss with microbiology

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3.11.4.3. Perinephric Abscess:

	Recommended Treatment	Alternative Treatment	Treatment Duration
Initial IV therapy	Vancomycin IV Target pre-dose level = 10-15mg/L – see Section 3.21 OR Teicoplanin IV if <70kg 400mg every 12 hours for 3 doses then 400mg daily. If ≥70kg 6mg/kg every 12 hours for 3 doses then 6mg/kg daily. PLUS Ciprofloxacin PO 750mg BD (or IV 400mg BD only for patients truly contraindicated to oral therapy) (caution in epilepsy)	Discuss with Microbiology	Depends on aetiology and clinical response
Switch to oral therapy if without contraindications and is clinically improving (refer to IV Oral Antibiotic Switch Guideline)	Ciprofloxacin PO 500mg BD (caution in epilepsy) PLUS Flucloxacillin PO 1g QDS	Discuss with Microbiology	

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3.12. Genital Tract Infection

ALL STI CASES MUST BE REFERRED TO GUM FOR SCREENING, TREATMENT AND CONTACT TRACING

Infections	Recommended treatment	Comments
Vaginal Thrush	Fluconazole PO 150mg STAT Or Clotrimazole 500mg pessary, insert at night as single dose	Oral Fluconazole is contraindicated in pregnancy, use Clotrimazole 500mg pessary without the applicator as the alternative.
Uncomplicated gonorrhoea **A patient with a positive TMA test for gonorrhoea should have swabs taken for culture and sensitivity as well as screening for other STI's please refer to GUM**	Cefixime PO 400mg single dose	Refer to GUM Clinic for screening and contact tracing. Appointments booking line 0161 627 8753
Trichomoniasis **This is an STI please refer to GUM for screening and contact tracing.**	Metronidazole PO 400mg BD 5 days OR Metronidazole PO 2g as a single dose	If pregnant, give Metronidazole PO 400mg BD but avoid single high dose OR Clindamycin 2% vaginal cream, insert 5g at night for 3-7 nights OR Metronidazole 0.75% vaginal gel, insert 5g at night for 7 nights
Other STIs such as syphilis, Chlamydial disease, Non Gonococcal Urethritis	The diagnosis, treatment and contact tracing of possible cases must be performed through GUM clinic. Consult local GUM Consultant. Appointments booking line 0161 627 8753	

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3.12.1. Pelvic Inflammatory Disease (PID)

Testing for gonorrhoea and chlamydia in the lower genital tract in women with suspected PID is strongly recommended. A positive result strongly supports the diagnosis of PID but the absence of infection at this site does not exclude PID. Ofloxacin should be avoided in patients who are at high risk of gonococcal PID because of increasing quinolone resistance in the UK (e.g. patient's partner has gonorrhoea, clinically severe disease, sexual contact abroad).

Current male partners of women with PID should be contacted and offered health advice and screening for gonorrhoea and chlamydia. Suggest refer to GUM.

3.12.1.1. For non-severe or outpatient treatment

- **First choice**
  - Ofloxacin oral 400mg twice daily for 14 days

  PLUS
  - Metronidazole oral 400mg twice daily for 14 days

Caution: Ofloxacin (i.e. quinolones) should not be used in pregnancy. See below or discuss with Microbiology for alternatives

- **Alternatives for non-severe or outpatient treatment**
  - Ceftriaxone IM 500mg STAT
    PLUS
  - Doxycycline oral 100mg twice daily for 14 days
    PLUS
  - Metronidazole oral 400mg twice daily for 14 days

3.12.1.2. For severe cases:

IV therapy is required and should be continued until 24 hours after clinical improvement and followed by oral therapy.

This includes: Intolerance to oral therapy
Lack of response to oral therapy

- Ceftriaxone IV 2g daily
  PLUS
- Doxycycline IV (unlicensed product) 100mg twice daily (or oral may be used if tolerated)
  PLUS
- Metronidazole IV 500mg three times daily

For 24-48 hours, then change to oral therapy if patient demonstrates substantial clinical improvement:

- Doxycycline orally 100mg twice daily,
  PLUS
- Metronidazole orally 400mg twice daily
  For a total of 14 days

Caution: Doxycycline (i.e. tetracyclines) should not be used in pregnancy. See below or discuss with Microbiology for alternatives.

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3.12.1.3. For treatment of PID in pregnancy

Pregnant women should NOT be treated with quinolone or tetracycline antibiotics.

- Cefixime oral 400mg STAT (or Ceftriaxone IM 250mg STAT for severe cases)
  PLUS
- Erythromycin oral 500mg four times daily for 14 days
  PLUS
- Metronidazole oral 400mg twice daily for 14 days (or IV therapy metronidazole 500mg TDS for severe cases)

REFER to Microbiologist for other complicated infections.

Reference: http://www.bashh.org/documents/3572.pdf

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3.13. Respiratory Tract Infections:

N.B. [§]Pregnancy – Erythromycin is the choice of macrolide where clarithromycin is recommended for this group of patients.

[#] Avoid using Doxycycline in pregnancy.

[ᵒᵒ]Levofloxacin – use with caution in epilepsy. Combination therapy with a macrolide is unnecessary except in cases of suspected Legionella disease or highly severe pneumonia not responding to β-lactam/macrolide duo therapy and must be guided on Micro / ID advice.

If previous sensitivities are known ensure that these are taken into account when selecting treatment option.

3.13.1. Community-Acquired Pneumonia (CAP)

CURB-65 Score: Score one point for each feature present

- **C**onfusion - Defined as a Mental Test Score of 8 or less, or new disorientation in person, place or time
- **U**rea > 7mmol/L
- **R**espiratory rate ≥ 30/min
- **B**lood pressure (SBP < 90 mmHg or DBP ≤60 mmHg)
- Age ≥ **65** years

CURB-65 Score	**0-1: Mild**	**2: Moderate**	**≥3: Severe**
Management Plan	Likely suitable for home treatment	Consider hospital-supervised treatment Options may include a) short inpatient stay b) hospital supervised outpatient	Manage in hospital as severe pneumonia. Assess for ICU admission especially for CURB-65 = 4 or 5
Investigations	CXR, Blood culture, FBC, Sputum culture, Serum for atypical pathogens, (Urine specimens for Legionella and Pneumococcal antigens for moderate to severe cases)		

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	Recommended Treatment	Alternative Treatments	Treatment Duration
Mild pneumonia			
Oral therapy	Amoxicillin PO 500mg TDS for 5 days	#Doxycycline PO 200mg STAT, then 100mg OD for 5 days OR Clarithromycin PO 500mg BD	5 days 5 days
Moderate pneumonia			
Oral therapy	Amoxicillin PO 1g TDS for 5-7 days PLUS Clarithromycin PO 500mg BD	#Doxycycline PO 200mg STAT, then 100mg BD OR Clarithromycin PO 500mg BD	5-7 days 7 days
Contraindicated to oral therapy			
Mild Moderate	Amoxicillin IV 500mg TDS Amoxicillin IV 1g TDS PLUS Clarithromycin IV 500mg BD	Clarithromycin IV 500mg BD Clarithromycin IV 500mg BD	Review daily. Switch to oral therapy if feasible (Refer to IV-Oral Antibiotic Switch Guideline)

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Severe pneumonia including ICU admission and/or with risk of coliform or pseudomonas aetiology, consider: -			
	Recommended Treatment	**Alternative Treatments**	**Treatment Duration**
N.B. Respiratory tract infection with these bacteria is, however, uncommon in patients with community acquired pneumonia.	∞Levofloxacin IV 500mg BD	Discuss with microbiology	Review at 24 hours for de-escalation or IV to Oral Switch (Legionella: 14–21 days)
Switch to oral therapy if without contraindications and is clinically improving	Amoxicillin PO 1g TDS PLUS Clarithromycin PO 500mg BD	Levofloxacin PO 500mg BD	Review daily and switch to oral therapy if feasible. Total therapy duration: 7-10 days (Legionella: 14–21 days) Total therapy duration: 7-10 days
If MRSA of concern	Add <u>Vancomycin</u> IV – Refer to section 3.21 - Vancomycin dosing and level monitoring guidelines . Target pre-dose level = 10-15mg/L		Depends on aetiology and clinical response.
Oral Choice	Consult Microbiologist / ID		

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3.13.2. Atypical pneumonia:

If Legionella is confirmed discuss treatment options with microbiology.

3.13.3. Acute Bronchitis:

Is characterised by a dry or productive cough of less than 3 weeks duration with no evidence of pneumonia on chest X-ray. It is normally caused by viral infections therefore no antimicrobial therapy is routinely indicated. **Only consider treatment if deteriorating clinically.**

Recommend	If antibiotic therapy is needed clinically, consider: -	Treatment Duration
No antibiotics	Amoxicillin PO 500mg TDS OR if penicillin allergic #Doxycycline PO 200mg STAT, then 100mg OD	5 days 5 days

3.13.4. Exacerbation of COPD:

Recommend NO antibiotic treatment unless clinical or radiological evidence of pneumonia or history of more purulent sputum

	Recommended Treatment	Alternative Treatment	Treatment Duration
No clinical or radiological evidence of pneumonia or more purulent sputum Recommend **NO** antibiotics.			
Exacerbation with purulent sputum	Amoxicillin PO 1g TDS for 5 days	#Doxycycline PO 200mg STAT, then 100mg BD for 5 days OR Clarithromycin PO 500mg BD	5 days 5 days
Oral therapy Contraindicated (Ref to IV-Oral Antibiotic Switch Guideline)	Amoxicillin IV 1g TDS	Clarithromycin IV 500mg BD	Review daily and switch to oral therapy if feasible. Total duration of 5 days
Clinical or radiological evidence of pneumonia	See Community Acquired Pneumonia (CAP) guidelines, Section 3.13.1 Consider recent sensitivity results for Streptococcus pneumoniae, Haemophilus influenzae and Moraxella catarrhalis. Note: Coliforms and Pseudomonas aeruginosa are normally colonisers when detected in sputum samples. If not responding to recommended therapy and a patient is growing these organisms please discuss with Microbiology.		

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3.13.5. Influenza

Follow the Pennine Acute Hospitals NHS Trust's 'Influenza treatment guidance'. These are available on the Trust's Influenza Advice and Guidance intranet page.

http://nww.pat.nhs.uk/Programmes-and-Projects/Winter%20Incl%20Flu/influenza-advice-and-guidance.htm

3.13.6. Hospital-Acquired Chest Infection or Pneumonia (HAP):

Empirical therapy is influenced by previous antibiotic exposure – seek Microbiologist advice

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3.13.6.1. Non-Ventilator Associated HAP / Post-operative Pneumonia:

N.B: Mild/Moderate/Severe classifications in HAP/VAP are not based on CURB-65 scores but individual clinical assessments.

N.B: Patients with early onset pneumonia but recent healthcare exposure may be treated as late onset.

Antibiotic Naïve	Recommended Treatment	Alternative Treatment	Treatment Duration
Mild, Early onset (< 5 days in hospital)	Amoxicillin PO 500mg TDS	#Doxycycline PO 200mg STAT, then 100mg OD OR Clarithromycin PO 500mg BD	5-7 days 5 days
Moderate, Early onset (< 5 days in hospital)	Amoxicillin PO 1g TDS for 5-7 days PLUS Clarithromycin PO 500mg BD 5 days	#Doxycycline PO 200mg STAT, then 100mg BD OR Clarithromycin PO 500mg BD	5-7 days 5-7 days
Oral therapy contraindicated: (Ref to IV-Oral Antibiotic Switch Guideline)			
Mild and Early-onset: Moderate and Early-onset:	Amoxicillin IV 500mg TDS Amoxicillin IV 1g TDS PLUS Clarithromycin IV 500mg BD	Clarithromycin IV 500mg BD ∞Levofloxacin IV 500mg OD	Review daily and switch to oral therapy if clinically feasible. Total duration including IV therapy: 5-7 days
Switch to oral therapy if without contraindications and is clinical improving (Ref to IV-Oral Antibiotic Switch Guideline)			
Mild and Early-onset: Moderate and Early-onset:	Amoxicillin PO 500mg TDS Amoxicillin PO 1g TDS PLUS Clarithromycin PO 500mg BD	Clarithromycin PO 500mg BD Clarithromycin PO 500mg BD	

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continued	Recommended Treatment	Alternative Treatment	Treatment Duration
Severe or Late onset (> 5 days in hospital) or recent health-care exposure	∞Levofloxacin IV 500mg BD	Discuss with microbiology	Total duration including IV therapy: 7-10 days
Switch to oral therapy if without contraindications and is clinically improving (Ref to IV-Oral Antibiotic Switch Guideline)	∞Levofloxacin PO 500mg OD or BD.	Discuss with microbiology	
If MRSA of concern	Add Vancomycin IV – Refer to Section 3.21 - Vancomycin dosing and level monitoring guidelines . Target pre-dose level = 10-15mg/L	Consult Microbiologist	Depends on aetiology and clinical response
Oral choice	Consult Microbiologist / ID		

3.13.6.2. Ventilator Associated Pneumonia (VAP)

Empirical therapy is influenced by previous antibiotic exposure – seek Microbiologist advice

	Recommended Treatment	Alternative Treatment	Treatment Duration
	Consult Microbiologist	Consult Microbiologist	Depends on aetiology and clinical response
If MRSA of concern	Add Vancomycin IV Refer to section 3.21 - Vancomycin dosing and level monitoring guidelines Target pre-dose level = 10-15mg/L, or For Continuous Infusion for selected ICU, refer to EDT015, or follow the link below http://nm-ashanti:86/DMS/DesktopModules/WroxDocs/ViewDocument.aspx?ItemID=2190&mid=9000&key=2190		

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3.13.7. Aspiration pneumonia

	Recommended Treatment	Alternative Treatment	Treatment Duration
Community acquired and/or Mild to Moderate.	Amoxicillin IV/PO 500mg-1g TDS PLUS Metronidazole IV 500mg TDS or PO 400mg TDS If IV initially used change to PO within 24 hours	Clarithromycin PO/IV 500mg BD PLUS Metronidazole IV 500mg TDS or PO 400mg TDS If IV initially used change to PO within 24 hours	5-7 days
Hospital acquired and/or Severe Infection	∞Levofloxacin IV/PO 500mg BD PLUS Metronidazole IV 500mg TDS or PO 400mg TDS If IV initially used change to PO within 24 hours	Meropenem IV 1g TDS A carbapenem should only be continued after discussion with a Consultant Microbiologist/ID Physician	5-7 days
If MRSA of concern	Add Vancomycin IV – Refer to Section 3.21 - Vancomycin dosing and level monitoring guidelines . Target pre-dose level = 10-15mg/L	Consult Microbiologist	Depends on aetiology and clinical response.
Comments:	Review daily and switch to oral therapy as soon as clinically feasible		

3.13.8. Pleural Infection:

	Recommended Treatment	Alternative Treatment	Treatment Duration
Initial IV Therapy	Consult Microbiologist	Consult Microbiologist	Depends on aetiology and clinical response
	Modify according to culture & sensitivity results		
Oral switch	According to Microbiology reports Or Consult Microbiologist		

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3.13.9. Pneumocystis jirovecii (Pneumocystis carinii) Pneumonia:

Pneumocystis jirovecii is a fungus that causes infection specific to humans. Pneumonia caused by *Pneumocystis jirovecii* occurs in immunosuppressed patients; it is a common cause of pneumonia in AIDs. Patients will typically present with malaise, fever, a dry cough and dyspnoea.

Blood cultures and a sputum sample should be obtained prior to starting treatment. A chest x-ray and oxygen saturation monitoring should also be completed to aid diagnosis.

It is possible to stratify disease severity using the table below which can subsequently be used to guide the treatment choice. Co-trimoxazole, a mixture of trimethoprim and sulfamethoxazole (sulphamethoxazole) in proportions of 1 part to 5 parts, is the drug of choice in the treatment of *Pneumocystis jirovecii* pneumonia. In moderate to severe infections associated with HIV infection steroids should be administered to the patient for the duration of treatment with co-trimoxazole. *Pneumocystis jirovecii* pneumonia in patients who are immunosuppressed without HIV have worse outcomes than in HIV/AIDs. Please contact the ID team on call regarding **anyone** suspected of having *Pneumocystis jirovecii* pneumonia.

	Disease severity		
	Mild	**Moderate**	**Severe**
Symptoms and signs	Dyspnoea on exertion with or without cough and sweats	Dyspnoea on minimal exertion and occasionally at rest; cough and fever with or without sweats	Dyspnoea and tachypnoea at rest; fever and cough
Oxygen PaO2 in room air at rest in kPa (mmHg)	> 11.0 (>83)	8.1-11.0 (61-83)	≤8.0 (≤ 60)
SaO2 at rest on air	>96	91-96	<91
Chest radiograph	Normal or minor perihilar shadowing	Diffuse interstitial shadowing	Extensive interstitial shadowing with or without diffuse alveolar shadowing
Co-trimoxazole dose and route	90mg/kg/day (in two divided doses) PO for 21 days.	120mg/kg/day (in four divided doses) IV for 3 days then 90mg/kg/day (in four divided doses) IV for a further 18 days.	

The tables below provide advice regarding the dose or number vials that need to be used dependent upon the patient's weight in normal renal function. Dose adjustments are needed if the patient's eGFR is 30mL/minute or below, please contact pharmacy, ID or clinical medical microbiology doctors for advice.

Prescribing advice: It is important that patients prescribed co-trimoxazole maintain adequate fluid intake. It should be avoided in blood disorders, blood counts should be monitored on prolonged treatment and the drug should be discontinued if blood

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disorders or a rash develop. Co-trimoxazole should be used with caution in patients who are predisposed to folate deficiency or hyperkalaemia, the elderly, those with asthma and G6PD deficiency.

Alternative treatments: Please contact ID or clinical medical microbiology doctors for alternative treatment choices if:

- The patient is allergic to trimethoprim and/or sulfamethoxazole (sulphamethoxazole).
- The patient is pregnant or breast-feeding.
- The patient has acute porphyria.
- The patient has severe hepatic impairment.

Dosing table for <u>oral</u> co-trimoxazole calculated at 90mg/kg/day in two divided doses. The dose in this table is expressed as mg as there are a number of different oral preparations available including 480mg tablets, 960mg tablets, 480mg/5mL oral suspension and 240mg/5mL oral suspension. Please select the most appropriate formulation for your patient. The doses stated in the table below will equate to a whole tablet or a measurable dose of liquid.

Weight range (kg)	Total daily dose (mg)	Time of administration and relevant dose (mg)	
		09:00	22:00
40-45	3840	1920	1920
46-50	4320	2400	1920
51-55	4800	2400	2400
56-61	5280	2880	2400
62-66	5760	2880	2880
67-72	6240	3360	2880
73-77	6720	3360	3360
78-82	7200	3840	3360
83-87	7680	3840	3840
88-93	8160	4320	3840
94-98	8640	4320	4320
99-103	9120	4800	4320
104-109	9600	4800	4800
110-114	10080	5280	4800

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Dosing table for IV co-trimoxazole calculated at 120mg/kg/day – to be given in FOUR DIVIDED doses. The doses in the table are expressed as NUMBER OF VIALS, only one strength of intravenous infusion is available which is 96mg/mL, this comes as a 5mL ampule meaning that there is 480mg in 5mL.

Weight range (kg)	Total number of vials per day	Total daily dose (mg)	Time of administration and number of vials to be given at that time			
			06:00	12:00	18:00	00:00
39-42	10	4800	2	3	2	3
43-46	11	5280	3	3	2	3
47-50	12	5760	3	3	3	3
51-54	13	6240	3	3	3	4
55-58	14	6720	3	4	3	4
59-62	15	7200	4	4	3	4
63-66	16	7680	4	4	4	4
67-70	17	8160	4	4	4	5
71-74	18	8640	4	5	4	5
75-78	19	9120	5	5	4	5
79-82	20	9600	5	5	5	5
83-86	21	10080	5	5	5	6
87-90	22	10560	5	6	5	6
91-94	23	11040	6	6	5	6
95-98	24	11520	6	6	6	6
99-102	25	12000	6	6	6	7
103-106	26	12480	6	7	6	7
107-110	27	12960	7	7	6	7
111-114	28	13440	7	7	7	7

Dosing table for IV co-trimoxazole calculated at 90mg/kg/day – to be given in FOUR DIVIDED doses. The doses in the table are expressed as NUMBER OF VIALS, only one strength of intravenous infusion is available which is 96mg/mL, this comes as a 5mL ampule meaning that there is 480mg in 5mL.

Weight range	Total number of vials per day	Total daily dose (mg)	Time of administration and number of vials to be given at that time			
			06:00	12:00	18:00	00:00
40-45	8	3840	2	2	2	2
46-50	9	4320	2	2	2	3
51-55	10	4800	2	3	2	3
56-61	11	5280	3	3	2	3
62-66	12	5760	3	3	3	3
67-72	13	6240	3	3	3	4
73-77	14	6720	3	4	3	4
78-82	15	7200	4	4	3	4
83-87	16	7680	4	4	4	4
88-93	17	8160	4	4	4	5
94-98	18	8640	4	5	4	5
99-103	19	9120	5	5	4	5
104-109	20	9600	5	5	5	5
110-114	21	10080	5	5	5	6

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3.14. Antibiotic Prophylaxis For Infective Endocarditis:

Following NICE Guidelines (March 2008) antibiotic prophylaxis against infective endocarditis is no longer recommended routinely, even for patients who were formerly thought to be at increased risk of endocarditis e.g. valve replacement and congenital heart disease.

However, patients at risk of endocarditis who are undergoing a gastro-intestinal or genito-urinry procedure at a site where infection is suspected, should receive an appropriate antibiotic that is effective against organisms that are likely to cause endocarditis, (please see section 3.20.2).

Patients at risk of endocarditis having a surgical procedure where antibiotic prophylaxis is recommended should have the same antibiotic as patients who are not as risk.

3.15. Empirical Treatments For Infective Endocarditis (IE)

3.15.1. Important notes:

Three sets of blood cultures should be taken from separate venepunctures at least an hour apart prior to commencing empirical antibiotic therapy.

Microbiology results should be reviewed at the earliest opportunity to modify antibiotic therapy according to the micro-organism identified and antibiotic sensitivities. Physicians are strongly encouraged to contact the Microbiologist for any provisional results available, especially for acutely-ill patients.

3.15.2. Treatment recommendations:

- **Acute presentation**
  Flucloxacillin IV 2g six hourly (or 2g four hourly if weight > 85kg)
  PLUS
  Gentamicin 1mg/kg (ideal body weight) IV bolus twelve hourly, modified according to renal function. Level monitoring required – see sections 3.15.3 and 3.24.1.2

- **Indolent (or chronic) presentation**
  Amoxicillin IV 2g four hourly
  PLUS
  Gentamicin 1mg/kg (ideal body weight) IV bolus twelve hourly, modified according to renal function. Level monitoring required – see sections 3.15.3 and 3.24.1.2

- **For true penicillin-allergy, intra-cardiac prosthesis and suspected MRSA e.g. in IV drug users and dialysis patients**
  Vancomycin IV, dosage to be modified according to renal function and level monitoring is required – see sections 3.15.3 and 3.21
  PLUS
  Rifampicin PO 300 – 600mg 12 hourly
  PLUS
  Gentamicin 1mg/kg (ideal body weight) IV bolus twelve hourly, modified according to renal function. Level monitoring required – see sections 3.15.3 and 3.24.1.2

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Empirical therapy should be modified and adjusted according to the Microbiology reports once the causative organism is identified and sensitivity known. Please liaise closely with the Microbiologist.

3.15.3. Level monitoring:

Gentamicin:
For multiple-dosing regimens blood samples should be taken to check BOTH the peak level (1hr post dose) to monitor efficacy and the trough level (pre-dose) to avoid accumulation and thereby prevent toxicity.
Gentamicin levels must be measured on the third or fourth dose after the start of treatment and after a dose change. If levels are in range, subsequent monitoring should be completed twice-weekly in patients with normal and stable renal function. Monitor levels more frequently in patients with renal impairment, if renal function deteriorates or if levels are found to be outside of the target range.

Blood should be taken approximately1 hour after administration ('peak' level) and also just before the next dose ('trough' level).
Gentamicin pre-dose (trough) level <1mg/L and 1 hr post-dose (peak) level = 3-5mg/L.

Vancomycin: pre-dose level should be taken prior to the 3rd or 4th dose. Target pre-dose level between 15-20 mg/L (higher range intended). Continue to monitor the renal function. For renally impaired patient measure levels earlier and more frequently.

Ref: Guidelines for the Antibiotic Treatment of Endocarditis in Adults: Report of the Working Party of the British Society for Antimicrobial Chemotherapy. JAC (2004) 54, 971-981

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3.16. Soft Tissue Infections:

Take blood culture, throat swab and skin swab (if moist).

Infections	Recommended treatment	Alternative
Cellulitis Likely caused by Group A/C Streptococci and Staph aureus	Flucloxacillin IV 1-2g QDS	**Mild:** Doxycycline PO 200mg STAT then 100mg OD OR **Moderate/severe:** Clindamycin IV 600mg QDS
Switch to oral therapy if without contraindications and is clinically improving (Refer to Section 3.5)	Flucloxacillin PO 500mg – 1g QDS	**Mild:** Doxycycline PO 200mg STAT then 100mg OD OR **Moderate/severe:** Clindamycin PO 300-450mg QDS
IV cannula related cellulitis Remove venflon	Flucloxacillin PO 500mg – 1g QDS	Doxycycline PO 200mg STAT then 100mg OD OR **Moderate/severe:** Clindamycin PO 300-450mg QDS
IF MRSA is of concern:	Vancomycin IV Target pre-dose level = 10-15mg/L – See Section 3.21 OR Teicoplanin IV if <70kg 400mg every 12 hours for 3 doses then 400mg daily. If ≥70kg 6mg/kg every 12 hours for 3 doses then 6mg/kg daily.	

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Infections	Recommended treatment	Alternative
Necrotising Fasciitis **Urgent verbal consultation with Microbiologist / ID strongly recommended**	Meropenem IV 1g TDS PLUS Clindamycin IV 600mg – 1.2g QDS A carbapenem should only be continued after discussion with a Consultant Microbiologist / ID Physician	This condition requires urgent Surgical review. Consult Microbiologist / ID for appropriate alternatives
IF MRSA is of concern:	Add Vancomycin IV. Target pre-dose level = 10-15mg/L. See Section 3.21 OR Teicoplanin IV if <70kg 400mg every 12 hours for 3 doses then 400mg daily. If ≥70kg 6mg/kg every 12 hours for 3 doses then 6mg/kg daily.	
Fournier's Gangrene **Urgent verbal consultation with Microbiologist / ID strongly recommended**	Meropenem IV 1g TDS PLUS Clindamycin IV 600mg – 1.2g QDS A carbapenem should only be continued after discussion with a Consultant Microbiologist / ID Physician	This condition requires urgent Surgical review. Consult Microbiologist / ID for appropriate alternatives
Erysipelas Likely caused by Group A Haemolytic Streptococci	Benzylpenicillin IV 1.2g 4-6 hourly	Clarithromycin IV 500mg BD
Switch to oral therapy if without contraindications and is clinically improving (Ref to IV-Oral Antibiotic Switch Guideline)	Amoxicillin PO 500mg TDS	Clarithromycin PO 500mg BD
Decubitus Sores Varicose ulcers	Limited role for antibiotics. Antibiotics only for severe cellulitis treat according to sensitivities following culture. Foul smelling excavating sore, consider Metronidazole IV/PO 500mg/400mg TDS for 7 days	
Infections	**Recommended treatment**	**Alternative**
Animal / Human bites	Co-amoxiclav PO 625mg TDS for 7 days	Doxycycline PO 200mg STAT then 100mg OD PLUS Metronidazole PO 400mg TDS Treat for 7days

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3.17. Diabetic Foot Infections (DFIs):

3.17.1. Important information:

- Common but clinically complex problem requiring expert assessment
- Largest cause of non traumatic lower limb amputation. Rapid access to appropriate antibiotics is a critical aspect of preventing amputation.
- Most community cases will be mild to moderate in severity, but more severe ones may lead to serious sequelae including osteomyelitis and amputation.

3.17.2. Likely causative pathogens:

- Acute infections: aerobic Gram positive cocci (including Staphylococcus aureus, Streptococci, Enterococci, Coagulase Negative Staphylococci) often as mono-microbial infection
- Chronic infections: Staphylococcus aureus, either alone or as a component of mixed infection, such as MRSA, Enterococci, Enterobacteriaceae and anaerobes.

3.17.3. Wound care is critical:

- Involves surgical debridement of necrotic tissue since healing will not take place in the presence of non-viable tissue and debris.
- Debridement should precede application of dressings, use of wound healing preparations or antimicrobial agents and should be supported by the provision of appropriate pressure relief.

3.17.4. Please note the following points for consideration when using this guidance:

- The suggested regimens for superficial and moderate infections are only for empirical therapy when the causative agents are not known. If the causative organism(s) have been identified, treatment should be targeted according to microbiological findings.
- For multi-resistant organisms, including MRSA, please discuss with Microbiologist.

3.17.5. Points to consider when diagnosing infection specific to patients with diabetes:

Infection in the diabetic foot requires specialist assessment and appropriate empirical therapy for the following reasons:

- Diagnosis of infection is clinical, therefore examination of the foot is an essential part of management.
- Microbiological sampling of the foot cannot be used to diagnose infection initially, but is used to identify infecting organisms. A specimen should be taken if there are clinical signs of an infection or treatment failure. Aspirations of purulent secretions, curettage of the post-debridement wound base, punch biopsy and extruded or biopsied bone are the best specimens for culture. However, microbiological sampling is not routinely required for mild infection unless recent antimicrobial therapy or previous isolation of antibiotic-resistant organisms.

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- Swabbing and deep tissue cultures appear to be equally reliable for the initial monitoring of antimicrobial treatment in severe diabetic foot infection. However, it is recommended that deep tissue might be more sensitive than swabbing for monitoring those isolates that have been selected for antibiotic resistance, i.e. those from ulcers that are still active after 30 days of treatment.
- Clinical signs of inflammation may be less obvious in the ischaemic foot and expert assessment by a specialist is needed.
- Critical ischemia may be misdiagnosed as infection because of redness, swelling and pain.
- The acute Charcot foot is also often first misdiagnosed as infection.
- If there is clinical suspicion of osteomyelitis or bone infection, a series of investigation must be undertaken to rule out osteomyelitis as the management strategy can be quite different in terms of choice of therapy and duration of treatment – see Section 3.8.

SEVERITY	MILD INFECTION	MODERATE	SEVERE
Symptoms	– Purulent or inflamed wound present – Limited to skin and superficial soft tissues – Inflammation extends <2cm from wound – Not systemically unwell	– Purulent or inflamed wound present in a patient who is systemically well with one of the following: - o Inflammation extends >2cm from wound o Lymphangitis spread beneath superficial fascia o Localised necrosis or gangrene o Involvement of muscle, tendon, joint or bone.	– Any infection accompanied by systemic toxicity (fever, chills, shock, vomiting, confusion, metabolic instability). – Any evidence of critical ischemia of the involved limb.

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Grading of severity	Recommended Treatment	Alternative	Treatment Duration
MILD Antibiotic-naïve	Flucloxacillin PO 1g QDS	Doxycycline PO 100mg BD OR Clindamycin PO 300mg QDS	For 5-7 days then review to either continue or discontinue when clinically appropriate
Non-antibiotic-naïve	Doxycycline PO 100mg BD OR Clindamycin PO 300 QDS	Discuss with Micro/ID	
If Pseudomonal infection suspected	Ciprofloxacin PO 750mg BD (caution in epilepsy)	Discuss with Micro/ID	
MODERATE Antibiotic-naïve	Flucloxacillin PO/ IV 1-2g QDS +/- Metronidazole PO 400mg TDS +/- <u>Gentamicin</u> IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – <u>section 3.23</u>**	Co-amoxiclav PO 625mg TDS OR Clindamycin PO 450mg QDS +/- Metronidazole PO 400mg TDS if anaerobes suspected	For 5-7 days then review to either continue or discontinue when clinically appropriate Switch IV to oral when clinically appropriate. If osteomyelitis is present, treat for at least 6 weeks, see section 3.8

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Grading of severity	Recommended Treatment	Alternative	Treatment Duration
Non-antibiotic-naïve	Co-amoxiclav IV 1.2g TDS Step down to suitable alternative in light of available microbiology results *Oral Switch Co-amoxiclav PO 625mg TDS * or as Oral option only for use in Specialist Foot Clinics where patients are deemed to be appropriate to be treated as outpatients under close clinical monitoring.	Ciprofloxacin IV 400mg BD (change to ciprofloxacin PO 500 - 750mg BD within 24 hours) (caution in epilepsy) PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours) **OR** Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23** PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours) *Oral Switch Ciprofloxacin PO 500-750mg BD (caution in epilepsy) PLUS Metronidazole PO 400mg TDS, **OR** Ciprofloxacin PO 500-750mg BD (caution in epilepsy) PLUS Clindamycin PO 300-450mg QDS	
If MRSA is suspected	Add Vancomycin IV or Teicoplanin IV Discuss with Micro/ID for oral options or treatment optimisation	Add Vancomycin IV or Teicoplanin IV Discuss with Micro/ID for oral options or treatment optimisation	
If Pseudomonal infection suspected	Add Ciprofloxacin PO 750mg BD (caution in epilepsy)	Ensure Ciprofloxacin PO 750mg BD included in regime (caution in epilepsy)	

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Grading of severity	Recommended Treatment	Alternative	Treatment Duration
SEVERE **Cautions: High CDT risk**	Meropenem IV 1g TDS - Add Vancomycin IV (or Teicoplanin IV) if MRSA suspected. A carbapenem should only be continued after discussion with a Consultant Microbiologist / ID Physician *Oral Switch Ciprofloxacin PO 500-750mg BD (caution in epilepsy) PLUS Clindamycin PO 300-450mg QDS * or as Oral option only for use in Specialist Foot Clinics where patients are deemed to be appropriate to be treated as outpatients under close clinical monitoring.	Clindamycin IV 600mg QDS PLUS Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23** - Add Vancomycin IV (or Teicoplanin IV) if MRSA suspected. *Oral Switch Ciprofloxacin PO 750mg BD (caution in epilepsy) PLUS Metronidazole PO 400mg TDS	For 10-14 days then review to either continue or discontinue when clinically appropriate Switch IV to oral when clinically appropriate. If osteomyelitis is present, treat for at least 6 weeks, see Section 3.8

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3.18. Recommendations For the Prevention Of Infection In Adults With An Absent Or Dysfunctional Spleen:

Patients who have conditions resulting in an absent / dysfunctional spleen are at increased risk of infection and should receive prophylactic vaccinations and lifelong antibiotic.

Patients are advised to carry a card or wear an identifying bracelet at all times.

3.18.1. Vaccine Schedule for Adults:

<table>
<tr><th>Vaccine</th><th>Dosing schedule</th><th>Booster</th></tr>
<tr><td>23-valent pneumococcal polysaccharide vaccine (PPV23)</td><td rowspan="3">1 DOSE of each should be given at least 2 weeks before an elective splenectomy. If this is not possible for an emergency, vaccination should be given at 14 days post-splenectomy or as soon as clinically stable prior to discharge.</td><td>Re-vaccinate every 5 years or more often in immuno-suppressed patients</td></tr>
<tr><td>(Menitorix®)

Combined Haemophilus influenzae type B (Hib) and Meningococcal group C conjugate vaccine</td><td rowspan="3">Not yet determined, please check the Green Book for the most up-to-date guidance. (May 2014)

For an individual considering travelling to a “high risk” country with an increased risk of serogroup A, W135 or Y disease, a booster dose of Menveo® should be considered depending on the timing of the last dose.</td></tr>
<tr><td>Meningococcal group B vaccine
(Bexsero®)</td></tr>
<tr><td>(Menveo®)

MenACWY conjugate vaccine</td><td rowspan="2">All patients should be given a dose of MenACWY conjugate vaccine (Menveo®) and Men B ((Bexsero®)
TWO months after the initial vaccination.

(please advise patient’s GP)</td></tr>
<tr><td>Meningococcal group B vaccine
(Bexsero®)</td></tr>
<tr><td>Influenza vaccine</td><td colspan="2">1 dose annually between October and December</td></tr>
</table>

The vaccines can be administered at the same time and should be given at separate sites, preferably a separate limb. If given in the same limb, they should be given at least 2.5 cm apart

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3.18.2. Lifelong Antibiotic Prophylaxis

- Phenoxymethylpenicillin tablets 250 mg BD

OR For penicillin allergic patients:

- Erythromycin tablets 500mg BD

3.18.3. Early Treatment Packs:

Patients should keep a supply of suitable antibiotics at home to take immediately if they develop raised temperature, malaise or shivering. Suitable antibiotics include Co-amoxiclav, or Levofloxacin or Clindamycin for penicillin allergic patients.

Advise patients to seek immediate medical attention.

3.18.4. Advice to patients

All patients should receive advice covering:

- Their lifelong increased risk of infection
- Recommended vaccines and antibiotic prophylaxis
- Importance of seeking help immediately should infection occur
- Recommendations for travel abroad due to increased risk i.e. malaria risk, tick bite (Babesiosis) and dog bites.
- Patients should be advised to keep a therapeutic course of antibiotics (early treatment packs)
- Advice about insect, cat and dog bites. Patients should receive a five-day course of co-amoxiclav (clindamycin plus ciprofloxacin in allergic patients) to prevent infection.

Download DoH information leaflet and patient card at
https://www.gov.uk/government/publications/splenectomy-leaflet-and-card

3.18.5. Travel vaccines

Meningococcal ACWY Conjugate Vaccine **(Menveo®)** should be offered to individuals travelling to countries with an increased risk of meningococcal infection e.g. sub-Saharan Africa. If an individual has recently received Men C conjugate vaccine, an interval of at least 4 weeks should be allowed before administration of the Meningococcal ACWY Conjugate Vaccine **(Menveo®).**

It is the responsibility of the Consultant Physician in charge of the patient to ensure that all patients are vaccinated, given antibiotic prophylaxis and counselled on the risk of infection. A checklist to record this information should be documented in the patients' notes and a copy sent to the General Practitioner, particularly important with the additional dose of **Menveo®** two months after the initial vaccination.

Reference: Immunisation against infectious disease (The Green Book) updated May 2014 via link:
https://www.gov.uk/government/collections/immunisation-against-infectious-disease-the-green-book

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3.19. Spontaneous bacterial peritonitis:

Spontaneous bacterial peritonitis	Recommended Treatment	Alternative
Treatment	Gentamicin IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23** PLUS Amoxicillin IV 1g TDS PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours)	If penicillin allergy: Ciprofloxacin IV 400mg BD (change to ciprofloxacin PO 500 - 750mg BD within 24 hours) (caution in epilepsy) PLUS Teicoplanin IV 600mg 12 hourly for 3 doses then OD PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours)
Oral step down	According to sensitivities use one of the following: • Amoxicillin PO 500mg TDS • Ciprofloxacin PO 500mg BD (caution in epilepsy) • Co-trimoxazole PO 960mg BD Total treatment course length normally 10 – 14 days. If no growth stop antibiotic treatment	
Prophylaxis	Co-trimoxazole PO 960mg daily	If Co-trimoxazole contra-indicated/not tolerated: Ciprofloxacin PO 500mg daily (caution in epilepsy)

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3.20. Surgical Prophylaxis:

3.20.1. General Principles and Goals of Antibiotic Prophylaxis:

- **Goals of antibiotic prophylaxis for surgical patients are: -**
  - To reduce incidence of surgical site infection (SSI)
  - To use antibiotics in a manner that is supported by evidence of effectiveness
  - To minimise the effect of antibiotics on the patient's normal bacterial flora and host defences
  - To minimise adverse effects and costs

- **General Principles of antibiotic prophylaxis**
  - **Choice** – the antibiotics selected for the operation / procedure must possess good activity against the organisms most likely to contaminate the operative site.
  - **Route** – the antibiotics should be administered intravenously (IV)
  - **Timing** – First dose must be given at induction and on the ward, within 60 minutes before the skin is incised for all surgery.
  - **Duration** - Single dose of antibiotic is generally recommended for most circumstances. However, additional doses should be administered intra-operatively if:
    - surgery has lasted over 4 hours
    - blood loss of ≥ 1.5L
  - **Penicillin Allergy** – all patients with a history of penicillin allergy must be carefully evaluated to ensure that they are not wrongly attributed with a "Penicillin Allergy", otherwise, their optimal management may be compromised.

    Patients with a history of allergic reactions, such as anaphylaxis, laryngeal oedema, bronchospasm, hypotension, local swelling, urticaria or pruritic rash occurring immediately after a penicillin therapy must NOT receive further doses of penicillins or β-lactam antibiotics (i.e. penicillins, co-amoxiclav (Augmentin®), cephalosporins, piperacillin/tazobactam *(Tazocin®), meropenem etc). Tazocin is a brand name for Piperacillin/Tazobactam. When Tazocin is indicated, it must be prescribed as Piperacillin/Tazobactam.

The recommendations contained in this guideline are based on national guidelines and BNF recommendations. Doses recommended apply to average size adult patients with normal renal and hepatic function.

The antibiotic prophylaxis guidelines apply to all elective **clean, clean-contaminated or contaminated surgeries** or procedures.

Single dose prophylactic antibiotics will be sufficient in most cases.
However, if established infection is found at surgery e.g. pus in the abdominal cavity, evidence of peritonitis, or contaminated wounds e.g in RTA, a full treatment course of antibiotics will be required. Refer to the relevant sections in the Antibiotic Policy.

Recommendations:

- The decision regarding the benefits and risks of giving prophylaxis to an

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individual patient is made by the anaesthetist / surgeons based on the:

- Patient's risk of SSI
- Potential severity of the consequences of SSI
- Effectiveness of prophylaxis in that operation
- Consequences of the prophylaxis for that patient

- However, if the surgeon believes that a non-risky patient is to be at a particularly high risk from SSI and is deemed to be justified to receive the prophylactic antibiotic, the criteria used for the risk assessment must be recorded clearly.
- All antibiotic prophylaxis must be prescribed on the drug chart with a STOP DATE to prevent unduly prolonged course.
- Topical MRSA eradication regimen should be completed for all elective patients who are known to be MRSA carriers prior to surgery.
- Known MRSA positive patients undergoing emergency procedures should have **Teicoplanin IV 400mg** added to the recommended regimen.
- Where **Gentamicin** is used, the total dose **should not exceed 320mg** and must be calculated according to the lean body weight. (See formulae in section 3.23 of the Antibiotic Policy for Adult Patients.)
- All doses to be given intravenously unless stated otherwise.

3.20.2. Prophylactic Antibiotics for Common Surgery Types:

3.20.2.1. Gastro-Intestinal Procedures:

Surgery Types	First Line Regimen	Alternative Regimen
Prophylactic antibiotic(s) must be given within 60min before skin incision		
- Oesophageal surgery - Gastroduodenal surgery - Appendicectomy - Colorectal surgery	**At induction:** Co-amoxiclav IV 1.2g	**At induction:** Gentamicin IV 5mg/kg (max 320mg) PLUS Metronidazole IV 500mg
- Hernia repair **with** mesh	**At induction:** Co-amoxiclav IV 1.2g	**At induction:** Clindamycin IV 600mg
- Hernia repair **without** mesh and minor anal condition	Not Recommended	
If a patient is a known MRSA carrier or at high risk of post-operative MRSA infection, Teicoplanin IV 400mg should be included in the prophylaxis regimen.		

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3.20.2.2. Biliary Surgery:

Surgery Types	First Line Regimen	Alternative Regimen
Prophylactic antibiotic(s) must be given within 60 min before skin incision		
- Laparoscopic cholecystectomy - Cholangiogram or T-tube extraction	**At induction:** Co-amoxiclav IV 1.2g	**At induction:** Gentamicin IV 5mg/kg (max 320mg) PLUS Metronidazole IV 500mg
Chemo-embolisation i.e. **Liquid TACE** and **Bead TACE** **For Liquid TACE** only **For Bead TACE** only	**At induction:** Co-amoxiclav IV 1.2g **Post-op:** Co-amoxiclav PO 625mg 8 hourly for 5 days **Post-op:** Co-amoxiclav IV 1.2g or PO 625mg 8 hourly for 48 hours	**At induction:** Ciprofloxacin IV 400mg PLUS Metronidazole IV 500mg **Post-op:** Ciprofloxacin PO 500mg 12 hourly PLUS Metronidazole PO 400mg 8 hourly for 5 days **Post-op:** Ciprofloxacin PO 500mg 12 hourly PLUS Metronidazole PO 400mg 8 hourly for 48 hours
- Insertion of Portacath/ Denver shunt	Flucloxacillin PO 500mg 6 hourly for 24 hours (Start first dose on IV if NBM)	Clindamycin PO 450mg 6 hourly for 24 hours (Start first dose on IV if NBM)
If a patient is a known MRSA carrier or at high risk of post-operative MRSA infection, Teicoplanin IV 400mg should be included in the prophylaxis regimen.		

3.20.2.3. Vascular Surgery:

Surgery Types	First Line Regimen	Alternative Regimen
Prophylactic antibiotic(s) must be given within 60min before skin incision		
- All major vascular procedures - Amputation of lower limb	**At induction:** Co-amoxiclav IV 1.2g	**At induction:** Teicoplanin IV 400mg PLUS Gentamicin IV 5mg/kg (max 320mg) PLUS Metronidazole IV 500mg
- Prevention of gas-gangrene in high lower-limb amputation	**At induction:** Benzylpenicillin IV 600mg 6 hourly for 5 days	**At induction:** Metronidazole 400mg (PO) OR 500mg (IV) 8 hourly for 5 days
If a patient is a known MRSA carrier or at high risk of post-operative MRSA infection, Teicoplanin IV 400mg should be included in the prophylaxis regimen.		

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3.20.2.4. Urology:

Surgery Types	First Line Regimen	Alternative Regimen
Prophylactic Antibiotic(S) Must Be Given Within 60min Before Skin Incision Please Use Ciprofloxacin With Caution To Avoid Risk Of MRSA / C.Difficile Infections. A Single Dose Prophylaxis Is Sufficient If Urine Is Uninfected.		
Catheterisation (In The Presence Of Metal Work)	Gentamicin IV 160mg	
Trans-Rectal Prostate (TRUS) Biopsy	**At Induction:** Ciprofloxacin PO 1g PLUS Metronidazole PO 400mg 1 Hour Before Biopsy	**At Induction:** Gentamicin IV 5mg /Kg (Max 320mg) PLUS Metronidazole IV 500mg
TURP (Infection, Bacteriuria Or Catheter Present)	**At Induction:** Co-Amoxiclav IV 1.2g PLUS Gentamicin IV 160mg Before Surgery, Then Review And Treat According To Sensitivity Result	**At Induction:** Gentamicin IV 5mg /Kg (Max 320mg), Then Review And Treat According To Sensitivity Result
- Nephrectomy - Nephrostomy	**At Induction:** Co-Amoxiclav IV 1.2g	**At Induction:** Gentamicin IV 5mg /Kg (Max 320mg)
If A Patient Is A Known MRSA Carrier Or At High Risk Of Post-Operative MRSA Infection, Teicoplanin IV 400mg Should Be Included In The Prophylaxis Regimen.		

3.20.2.5. Maxillo-Facial Surgery:

Surgery Types	First Line Regimen	Alternative Regimen
Prophylactic antibiotic(s) must be given within 60min before skin incision		
Nose, sinus surgery and tonsillectomy	Not Recommended	
Neck dissection / procedures with incision through the oral / pharyngeal mucosa	**At induction:** Co-amoxiclav IV 1.2g **Post-op:** Co-amoxiclav IV 1.2g 8 hourly for 2 further doses	**At induction:** Clindamycin IV 600mg PLUS Gentamicin IV 5mg /kg (max 320mg) **Post-op:** Clindamycin PO 300mg 6 hourly for 3 further doses
Wisdom tooth extraction	**At induction:** Metronidazole IV 500mg or PO 400mg as single dose	
If a patient is a known MRSA carrier or at high risk of post-operative MRSA infection, Teicoplanin IV 400mg should be included in the prophylaxis regimen.		

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3.20.2.6. Obstetrics:

SURGERY TYPES	FIRST LINE REGIMEN	ALTERNATIVE REGIMEN
Prophylactic antibiotic(s) must be given within 60min before skin incision		
Caesarean Section	Pre-term: Cefuroxime IV 1.5g +/- Metronidazole Full term: Co-amoxiclav IV 1.2g	All gestations: Clindamycin IV 600mg
Caesarean Section in women with cardiac disease	NICE guidance - **NIL** recommended for prevention of infective endocarditis. Consult Cardiologist for special cases. Routine caesarean section antibiotic prophylaxis is recommended as above.	
3rd / 4th degree tears	Co-amoxiclav PO 625mg 8 hourly for 5 days	Clindamycin PO 300mg 6 hourly for 5 days
Group B strep (mother) in labour	Benzylpenicillin IV 3g initially, then 1.5 g four hourly until delivery	Clindamycin IV 900mg 8 hourly until delivery
For preterm pre-labour rupture of membranes	Erythromycin PO 250 mg 6 hourly until delivery or for a maximum of 10 days	
Prolonged rupture of membranes at term (i.e. over 24 hrs)	New NICE guidance – **NIL** recommended unless signs of sepsis.	
	If septic – start Co-amoxiclav IV 1.2g 8 hourly. Consider IV to Oral switch if clinically feasible.	If septic – start Clindamycin IV 900mg 8 hourly PLUS Gentamicin IV 160mg initially then 80mg 8 hourly until delivery (monitor pre- & post-dose levels)
	If GBS positive in mother – start prophylaxis as above.	
Pyrexia / suspected chorioamnionitis / sepsis in labour	Co-amoxiclav IV 1.2g 8 hourly until clinically necessary	**For mild penicillin allergy:** Cefuroxime IV 1.5g 8 hourly, PLUS Metronidazole IV 500mg 8 hourly or PR 1g 12 hourly. **For severe and true penicillin allergy with anaphylaxis:** Clindamycin IV 900mg 8 hourly PLUS Gentamicin IV 160mg initially then 80mg 8 hourly until delivery (monitor pre- & post-dose levels)

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3.20.2.7. Gynaecological:

SURGERY TYPES	FIRST LINE REGIMEN	ALTERNATIVE REGIMEN
Prophylactic antibiotic(s) must be given within 60min before skin incision		
Hysterectomy (Vaginal, abdominal, radical)	**At induction:** Co-amoxiclav IV 1.2g	**At induction:** Clindamycin IV 600mg
Surgical Termination Of Pregnancy (TOP) or Evacuation of uterus	Metronidazole PO 400mg, or PR 1g. Add Doxycycline PO 100mg BD for 7 days if genital chlamydial infection can not be ruled out.	
If a patient is a known MRSA carrier or at high risk of post-operative MRSA infection, Teicoplanin IV 400mg should be included in the prophylaxis regimen.		

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3.20.2.8. Orthopaedic Surgery:

<table>
<tr><th>SURGERY TYPES</th><th colspan="2">FIRST LINE REGIMEN</th><th>§ALTERNATIVE REGIME</th></tr>
<tr><td colspan="4">Administer entire dose of antibiotic at least 10 minutes before tourniquet applied.
No prophylaxis required for closed clean orthopaedic procedures without implants/prosthesis such as arthroscopy.</td></tr>
<tr><td colspan="2">- Total hip replacement
- Total knee replacement

- All Fracture Neck of Femur Patients

- Major Joint Arthroplasty</td><td colspan="2">At Induction only
Teicoplanin IV 400mg
PLUS
*Gentamicin IV - *Dose according to renal function
eGFR >60 ml/min: 5mg/kg (max 320mg)
eGFR ≥30 ml/min: 3mg/kg (max 200mg)
eGFR <30 ml/min: 2mg/kg (max 120mg) - Discuss with Renal Team)</td></tr>
<tr><td colspan="2">- Open reduction internal fixation of fractures

- Intramedullary nailing
- Other implant/metal work insertion</td><td>At Induction only
Flucloxacillin IV 1g
PLUS
*Gentamicin IV -
(Dose according to renal function as above)</td><td>At Induction only
Teicoplanin IV 400mg
PLUS
*Gentamicin IV -
(Dose according to renal function as above)</td></tr>
<tr><td colspan="2">- Percutaneous intervention e.g. Kirschner wires</td><td>At Induction only
Flucloxacillin IV 1g</td><td>At Induction only
Teicoplanin IV 400mg</td></tr>
<tr><td rowspan="3">Compound fracture +/- Metalwork</td><td rowspan="2">Type I, II</td><td colspan="2">At Induction:
Flucloxacillin IV 1g PLUS
*Gentamicin IV -
(Dose according to renal function as above)</td><td>At Induction:
Teicoplanin IV 400mg PLUS
*Gentamicin IV -
(Dose according to renal function as above)</td></tr>
<tr><td colspan="3">Wounds with farm yard/ heavy soil contamination - Add Metronidazole IV 500mg
Post – op:
Flucloxacillin IV 1g 6 hourly +/- Metronidazole IV 500mg 8 hourly for 24 hours</td></tr>
<tr><td rowspan="2">Type III</td><td colspan="3">At Induction:
Teicoplanin IV 400mg PLUS
*Gentamicin IV (Dose according to renal function as above)
PLUS
Metronidazole IV 500mg</td></tr>
<tr><td colspan="3">Post-op
Teicoplanin IV 400mg at 12 hr and 24 hr then OD PLUS Metronidazole IV 500mg 8 hourly for 72 hours from last debridement or until definitive wound closure.
Discuss with Microbiology</td></tr>
<tr><td colspan="2">Elective Spinal surgery (laminectomy, spinal fusion)</td><td>At induction:
Flucloxacillin IV 1g</td><td>At induction:
Teicoplanin IV 400mg</td></tr>
<tr><td colspan="2">Revision surgery</td><td colspan="2">Consult Microbiologist</td></tr>
<tr><td colspan="2">Post-op catheter insertion</td><td colspan="2">Gentamicin IV 160mg (if previous Gentamicin dose is >24hrs)</td></tr>
<tr><td colspan="4">§ For known MRSA carrier, patient at high risk of post-operative MRSA infection and/or Penicillin Allergic.</td></tr>
</table>

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3.20.2.9. Breast Surgery:

SURGERY TYPES	FIRST LINE REGIMEN	ALTERNATIVE REGIMEN
Prophylactic antibiotic(s) must be given within 60min before skin incision		
Breast surgery	**At induction:** Co-amoxiclav IV 1.2g	**At induction:** Clindamycin IV 600mg
If a patient is a known MRSA carrier or at high risk of post-operative MRSA infection, Teicoplanin 400mg IV should be included in the prophylaxis regimen.		

3.20.2.10. Cardiology:

SURGERY TYPES	FIRST LINE REGIMEN	ALTERNATIVE REGIMEN
Pacemaker insertion	**At induction:** Teicoplanin IV 400mg (with additional gentamicin 80mg infiltrated into the pacemaker pocket at the time of procedure at the discretion of the operator)	**At induction:** Consult Cardiologist for advice
Indwelling temporary pacing wires	Flucloxacillin PO 500mg 6 hourly until further instructions from Consultant Cardiologist	Consult Cardiologist for advice

3.20.3. Antibiotic Prophylaxis In Gastro-Intestinal Endoscopy:

PROCEDURE TYPES	FIRST LINE REGIMEN	ALTERNATIVE REGIMEN
GASTRO-INTESTINAL PROCEDURES: **Prophylactic antibiotic(s) must be given within 60min before skin incision** Reference: Antibiotic prophylaxis in gastrointestinal endoscopy. Allison et al. GUT 2009 58:869-880		
For prevention of endocarditis	Not recommended	
Diagnostic ERCP for biliary obstruction and / or common bile duct stones and / or straightforward stent changes	Not recommended but consider for full antibiotic treatment course post-procedure in cases of inadequate decompression of the biliary tree during the procedure	
ERCP for patients with on going cholangitis or (biliary) sepsis	No additional antibiotic required if patient is already on an established antibiotic treatment course.	
ERCP for patients undergoing biliary intervention post liver transplant	Ciprofloxacin PO 750mg STAT, 60-90 min before procedure, PLUS Amoxicillin IV 1g STAT OR Teicoplanin IV 400mg STAT, if penicillin allergic	Gentamicin IV 1.5mg/kg STAT by bolus injection over 3-5 min, at time of sedation, PLUS Amoxicillin IV 1g STAT OR Teicoplanin IV 400mg STAT, if penicillin allergic

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<table>
<tr><th>PROCEDURE TYPES</th><th>FIRST LINE REGIMEN</th><th>ALTERNATIVE REGIMEN</th></tr>
<tr><td rowspan="3">Therapeutic ERCP when complete biliary drainage unlikely to achieve (e.g. sclerosing cholangitis and /or hilar cholangiocarcinoma)

Patients with pancreatic cyst or pseudocyst</td><td>Ciprofloxacin PO 750mg STAT, 60-90 min before procedure</td><td>Gentamicin IV 1.5mg/kg STAT by bolus injection over 3-5 min, at time of sedation</td></tr>
<tr><td colspan="2">If patients become febrile post procedure, consider adding:</td></tr>
<tr><td><u>Gentamicin</u> IV:
5mg/kg if GFR >30 mL/min
3mg/kg if GFR 10 to 30 mL/min
if GFR less than 10 mL/min contact microbiology for advice.
Dose based on ideal body weight max 480mg round to nearest 40mg.
Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given at least 24 hours after the initial dose.
See single treatment and once daily dosing guidance – <u>section 3.23</u>
PLUS
Amoxicillin IV 1g TDS
PLUS
Metronidazole IV 500mg TDS
(change to metronidazole PO 400mg TDS within 24 hours)</td><td>If penicillin allergic:
Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours)
PLUS
<u>Gentamicin</u> IV:
5mg/kg if GFR >30 mL/min
3mg/kg if GFR 10 to 30 mL/min
if GFR less than 10 mL/min contact microbiology for advice.
Dose based on ideal body weight max 480mg round to nearest 40mg.
Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given at least 24 hours after the initial dose.
See single treatment and once daily dosing guidance – <u>section 3.23</u>
PLUS
<u>Vancomycin</u> IV, (level monitoring required –refer to Trust Policy, Section 3.21)</td></tr>
</table>

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PROCEDURE TYPES	FIRST LINE REGIMEN	ALTERNATIVE REGIMEN
Profound immunocompromised: ▪ Severe neutropenia (<0.5 x 109 / L), or ▪ Advanced haematological malignancy	No additional antibiotics if already receiving adequate broad spectrum antibiotic cover. Discuss with Haematologist / Microbiologist for advice.	
When patient has a history of prior biliary manipulations and requiring repeat biliary intervention at ERCP	If patient has been exposed to or on a prolonged course of antibiotic, suggest to change to: - <u>Gentamicin</u> IV: • 5mg/kg if GFR >30 mL/min • 3mg/kg if GFR 10 to 30 mL/min • if GFR less than 10 mL/min contact microbiology for advice. Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – <u>section 3.23</u>** PLUS Amoxicillin IV 1g TDS PLUS Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours)	Discuss with Microbiology

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<table>
<tr><th>PROCEDURE TYPES</th><th>FIRST LINE REGIMEN</th><th>ALTERNATIVE REGIMEN</th></tr>
<tr><td>Endoscopic ultrasound intervention: -
▪ Fine needle aspiration of solid lesions
▪ Fine needle aspiration of cystic lesions in or adjacent to the pancreas, and for endoscopic transgastric or transenteric drainage of pancreatic pseudocyst</td><td>Not indicated

Co-amoxiclav IV 1.2g STAT</td><td>Not indicated

Ciprofloxacin PO 750mg STAT</td></tr>
<tr><td rowspan="2">Variceal bleeding</td><td colspan="2">No additional antibiotic required, as patients would have been established on an IV therapy prior to undergoing endoscopy. Otherwise, the following is recommended: -</td></tr>
<tr><td>Co-trimoxazole IV 960mg BD
PLUS
Metronidazole IV 500mg TDS (change to metronidazole PO 400mg TDS within 24 hours)</td><td>Ceftriaxone IV 1g OD</td></tr>
<tr><td>PEG / PEJ</td><td>Co-amoxiclav IV 1.2g STAT, prior to procedure</td><td>Cefuroxime IV 750mg STAT, prior to procedure
For true anaphylactic reaction or angioedema with penicillin: -
Teicoplanin IV 400mg STAT</td></tr>
</table>

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3.21. Vancomycin Dosing and Level Monitoring Guidelines:

Note: level monitoring must be undertaken. Consult with Microbiologist / SpR in Microbiology for arrangement

3.21.1. What is Vancomycin?

- A glycopeptide antibiotic – closely related to teicoplanin
- IV Vancomycin must be given by slow IV infusion to avoid rapid infusion-related reactions (i.e. not exceeding a **maximum** of 10mg/min e.g. 1g over 100mins).
- Due to its potential ototoxicity and nephrotoxicity, patients receiving IV Vancomycin therapy for treatment of systemic infection require serum level monitoring to ensure efficacy and minimal toxicity.
- It is not absorbed if given orally. Therefore, Vancomycin **MUST** never be used orally for treatment of systemic infections. Oral Vancomycin is only used for treatment of Clostridium difficile infections (DOSE: 125mg **PO** QDS for 10-14 days).

3.21.2. Main clinical indications for IV Vancomycin:

- Suspected or confirmed MRSA bacteraemia; severe MRSA skin and soft tissues infections; MRSA bone and joint infections; MRSA pneumonia; vascular catheter-related sepsis – Discuss with Microbiologist for appropriate management.
- Treatment for infective endocarditis for patients with true penicillin allergy and/or when positive susceptibility results available for the isolated causative organism.

3.21.3. Initial Dosages:

Criteria	Dose	Dosing Interval
Weight > 70kg with normal renal function	1.5g	12 hourly
Weight 50-70kg with normal renal function or CrCl > 70ml/min	1g	12 hourly
Weight < 50kg or CrCl 30-70 ml/min or age >65yrs	750mg	12 hourly
CrCl<30ml/min or on dialysis	1g	Take a pre-dose level after 24 hours. Wait for the result before giving the next dose

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3.21.4. Method of administration:

- Dilute with either Sodium Chloride 0.9% or glucose 5% to a concentration of 5mg/ml (or up to a maximum of 10mg/ml for selected patients strictly in need of fluid restriction).
- Infusion rate: Max of 10mg/min e.g. 1g over 100mins.

3.21.5. Level Monitoring:

- Initially: Take the first pre-dose (trough) level immediately before the 3rd or 4th dose after the start of therapy.
- Unless specifically advised, **you do not need to wait for the level** before administering the next dose (see above dosage table for severe renal impairment or on dialysis).
- Target pre-dose (trough) level = 10-15mg/L (Note: a higher target range of 15-20mg/L might be recommended by a Microbiologist for highly resistant strains or for treatment of Infective Endocarditis).
- If the pre-dose (trough) level is within the target range and renal function remains stable: **Repeat pre-dose (trough) level every 3 to 4 days**.
- If dosage adjustment is made during therapy: **Repeat pre-dose (trough) level before the 3rd or 4th dose after the change,** as above.
- If renal function changes during therapy: **Repeat pre-dose (trough) level more frequently i.e. after every 3 or 4 doses**.
- There is **NO** need to monitor peak vancomycin levels.
- There is **NO** need to monitor pre-dose (trough) levels daily unless in severe renal impairment or specifically advised.

3.21.6. Recommendation:

Discuss with Microbiologist or ID for an alternative if renal function continues to deteriorate and/or patient unable to tolerate vancomycin and/or unable to obtain blood for level monitoring and/or fail to respond.

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3.22. Teicoplanin Dosing and Level Monitoring Guidelines for adult patients:

3.22.1. Dosages:

- <70kg: 400mg every 12 hours for 3 doses, followed by 400mg once daily.
- ≥70kg: Initially 6mg/kg every 12 hours for 3 doses, then 6mg/kg once daily.
- For Infective Endocarditis or other deep seated infections: Initially10-12mg/kg every 12 hours for 3 doses , then 10-12mg/kg once daily.
- Higher doses of up to 12mg/kg every 12 hours for 3 doses, then 12mg/kg once daily are occasionally recommended by microbiology or ID for bone and joint or other deep seated infections.
- A dose reduction is needed after the 4th day of treatment in renal impairment (eGFR <80mL/min) please contact pharmacy or microbiology for advice.

3.22.2. Level Monitoring:

- Plasma teicoplanin concentrations are not routinely measured because a relationship between plasma concentrations and toxicity has not been established.
- However, the plasma-teicoplanin concentration can be used to optimise parenteral treatment in severe or deep-seated infections to ensure that an appropriate therapeutic dose is administered. Furthermore level monitoring may be of value when treatment failure is suspected or in patients with renal impairment.
- If required a trough (pre-dose) level should be taken after day 3 of treatment. The level is not processed locally, therefore it is advised that treatment is continued until the level is available for evaluation, unless there is clinical suspicion of treatment failure, toxicity or resolution of infection. Please contact pharmacy or microbiology for further advice in these situations.
- During prolonged courses (more than 7 days) teicoplanin trough (pre-dose) serum levels may be performed at least once a week to ensure that level remains stable.
- The target trough (pre-dose) level is greater than 20mg/L. The normal target trough (pre-dose) level range for severe infections is 20-60mg/L.

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3.23. Single treatment and once daily gentamicin dosing and monitoring guideline for adult patients:

3.23.1. Introduction:

Gentamicin is an aminoglycoside antibiotic with broad-spectrum bactericidal activity. It has a number of adverse effects which can be associated with its use including nephrotoxicity and occasionally acute renal failure, irreversible cumulative ototoxicity, vestibular damage, hypersensitivity, anaemia, blood dycrasias, purpura, stomatitis, convulsions, electrolyte disturbances and effects on liver function occur occasionally. Subsequently therapeutic drug monitoring must be done to avoid adverse events and to individualise dose regimens in order to attain and remain within the desired therapeutic range.

Once daily administration of gentamicin is preferred as it provides prolonged post-antibiotic effect, potentially higher antibacterial concentrations at the site of infection, and theoretical reductions in the incidence of adaptive resistance, with no apparent increase in oto- or nephrotoxicity. Furthermore this method is favoured as it is more convenient to administer and conduct therapeutic drug monitoring when prescribed once daily.

As there is some evidence that risk of both ototoxicity and nephrotoxicity is related to the level of total exposure, duration of therapy should be the shortest possible compatible with clinical recovery. Subsequently, whenever possible parenteral treatment should **NOT exceed 7 days.**

To avoid adverse events, continuous **monitoring** (before, during and after) of renal function (serum creatinine, creatinine clearance), control of function of vestibule and cochlea as well as hepatic and laboratory parameters is recommended.

Contraindications to use:

- Myasthenia Gravis
- Previous hypersensitivity reactions to aminoglycosides

Caution in use:

- Parkinsonism and other conditions characterised by muscular weakness.
- Pregnancy
- Renal impairment
- Renal transplant
- If possible dehydration should be corrected before starting treatment
- Elderly patients

Drug interactions:

The use of other nephrotoxic drugs such as other aminoglycosides, vancomycin, some cephalosporins, ciclosporin, cisplatin, and fludarabine and of potentially ototoxic drugs such as etacrynic acid and furosemide may increase the risk of aminoglycoside toxicity. Subsequently when possible these drugs should not be administered concomitantly.

The use of once daily gentamicin should not be used in the following groups:

- Endocarditis treatment (see multiple daily dose regimen below)
- Pregnancy
- Significant renal impairment

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- Renal dialysis
- End stage renal disease
- Cystic fibrosis
- Major burns (>20% body surface area)
- Ascites

Please consult Microbiology for an appropriate dose regimen for the above patient groups.

3.23.2. Prescribing in renal impairment:

Renal function is measured either in terms of estimated glomerular filtration rate (eGFR) or it can be expressed as creatinine clearance normally calculated from the Cockcroft and Gault formula. The Trust reports patient's renal function as eGFR on LabCentre and though this can be used to facilitate in working out the most appropriate dose care must be taken in patients at extremes of body weight. In these patients the absolute glomerular filtration rate (GFR) or estimated creatinine clearance (CrCl) should be calculated using one of the formulae below.

Absolute glomerular filtration rate (GFR):

GFR Absolute = eGFR x (individual's body surface area/1.73)

Cockcroft and Gault formula:

$$\text{Male: CrCl (ml/min)} = \frac{1.23 \times (140-\text{age}) \times \text{weight (kg)}}{\text{Serum creatinine (micromol/L)}}$$

$$\text{Female: CrCl (ml/min)} = \frac{1.04 \times (140-\text{age}) \times \text{weight (kg)}}{\text{Serum creatinine (micromol/L)}}$$

Attempts should be made to determine the patient's GFR before gentamicin is prescribed, however this should not delay the administration of antibiotics to septic patients.

3.23.3. Dose calculation:

Gentamicin is poorly distributed into fatty tissues subsequently it is recommended that the dosage calculations should be based on an estimate of **lean or ideal body weight**.
Actual body weight should be used to calculate the dose unless the weight is more than 20% over their lean or ideal body weight, in which case an **adjusted body weight** should be used to calculate the dose.

Ideal body weight (IBW) can be calculated from:

Male patients: IBW (kg) = 50 kg + 2.3 kg for each inch over 5 feet
Female patients: IBW (kg) = 45.5 kg + 2.3 kg for each inch over 5 feet

Adjusted body weight:

Adjusted body weight = IBW (kg) + 0.4 x (actual body weight – IBW)

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3.23.4. Single treatment and once daily gentamicin dose schedule:

The recommended initial doses are:

Dose if GFR or CrCl > 30mL/minute:

5mg/kg daily
Based on **lean body weight** (maximum dose 480mg) round to nearest 40mg

Dose if GFR or CrCl 10 - 30mL/ minute:

3mg/kg daily
Based on **lean body weight** (maximum dose 480mg) round to nearest 40mg

If GFR is KNOWN to be less than 10 mL/minute contact microbiology for advice, an alternative antibiotic may be recommended.

Many patients will only require **ONE** dose of gentamicin when given via this regimen. However if additional doses need to be given therapeutic drug monitoring **MUST** be done to calculate the appropriate dose interval (see below). The second dose should be given **at least 24 hours** after the initial dose.

Please check whether the patient has had a previous dose of gentamicin before prescribing. Remember doses may have been prescribed for example in A&E, on the "STAT" section of the drug chart or ePMA or in theatre as well as on the scheduled section of the drug chart or ePMA.

3.23.5. Therapeutic drug monitoring:

Take a pre-dose (trough) gentamicin level before administering the second dose of gentamicin. This should be done 24 hours after the initial dose was administered or up to an hour prior to the next scheduled dose. Wait for the level to be reported and only administer the next dose if the level is **under 1mg/L.**

If the trough gentamicin level is **under 1mg/L** administer the second dose and the dose interval should be maintained at 24 hourly.

If the trough gentamicin level is **above 1mg/L, omit** the second dose and repeat the gentamicin level every 12 hours until it is less than 1mg/L. The second dose may be administered once the levels are less than 1mg/L. The time interval between the administration of the first dose and the point at which the level falls below 1mg/L can be used to inform the dosing interval moving forwards. For example if it takes 36 hours for the gentamicin level to fall below 1mg/L from the time of first administration the dosing interval moving forwards would be 36 hours.

Please include as much detail as possible when completing the blood request form, include:

- Clinical details
- State that the sample is a pre-dose (trough) sample
- The time and date that the last dose was administered
- The time and date that the blood sample was taken

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3.23.6. Follow on monitoring:

- Continue to monitor renal function throughout treatment with gentamicin.
- If the renal function in normal and remains stable trough gentamicin levels should be checked every 2 to 3 days.
- If the renal function is impaired or deteriorates trough gentamicin levels should be checked daily and the next dose should only be given if the level is **under 1mg/L.**
- Auditory and vestibular function should be monitored during treatment.
- Fluid balance
- Hepatic function
- Electrolytes

3.23.7. Administration:

When given as a once daily dose gentamicin should be administered as an intravenous infusion over 60 minutes. The required dose should be diluted with 50-100mL of sodium chloride or glucose 5%.

3.23.8. Supporting References:

Brayfield A (ed), Martindale: The Complete Drug Reference. [online] London: Pharmaceutical Press <http://www.medicinescomplete.com/> (accessed on [10/04/17]).

Joint Formulary Committee. British National Formulary (online) London: BMJ Group and Pharmaceutical Press <http://www.medicinescomplete.com> [Accessed on [10/04/17]]

Ashley C, Dunleavy A eds. The Renal Drug Database London: Radcliffe Publishing. Accessed via https://www.renaldrugdatabase.com/ on 10.04.17.

Garraghan F, Fallon R Gentamicin: dose regimens and monitoring. *The Pharmaceutical Journal.* 2015; 295:7874-5.

Drew, RH. Dosing and administration of parenteral aminoglycosides. In: UpToDate, Post, TW (Ed), UpToDate, Waltham, MA, 2014. (Accessed on 10/04/17.)

Injectable Medicines Guide Gentamicin IV monograph, written December 2014. Medusa website (password required) (last accessed 10/04/2017)

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3.24. A Guide to Therapeutic Drug Monitoring:

3.24.1. Gentamicin:

3.24.1.1. Once-Daily Dosing Regimen:

Refer to **Once-daily Gentamicin dosing and monitoring guideline** section 3.23 in the Antibiotic Policy.

Contact Pharmacy / Microbiology on your site for further advice.

3.24.1.2. Multiple-Dosing Regimen for Treatment of Infective Endocarditis:

See Section 3.15 for dosing and patients who are inappropriate for the Once-daily dosing regimen.

For multiple-dosing regimens blood samples should be taken to check BOTH the peak level (1hr post dose) to monitor efficacy and the trough level (pre-dose) to avoid accumulation and thereby prevent toxicity.

Time of level monitoring
Gentamicin levels must be measured on the **third or fourth** dose after the start of treatment and after a dose change. If levels are in range, subsequent monitoring should be completed twice-weekly in patients with normal and stable renal function. Monitor levels more frequently in patients with renal impairment, if renal function deteriorates or if levels are found to be outside of the target range.

Target Levels	**For Infective Endocarditis (see Section 18 for dosing)**	**Others indications when Once-daily dosing is inappropriate**
Trough level (pre-dose)	<1 mg/L	<2 mg/L
Peak level (1hr post dose)	3 – 5 mg/L	5-10 mg/L

3.24.2. Amikacin and Tobramycin:

Should only be used on the advice of a Microbiologist / ID Consultants

Drug	**Dosages (based on ideal body weight)**	**Target Pre-dose Levels**
Tobramycin	7mg/kg once daily	< 1mg/L
Amikacin	15mg/kg once daily OR 15mg/kg in 2 divided doses	<5mg/L OR <10mg/L

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Both Tobramycin and Amikacin assays are not processed locally. Therefore, it is recommended to send blood for assays before 8am during weekdays.

Advise to take levels prior to the second dose and continue the recommended dose daily until levels are available for evaluation. Continue to monitor the renal function**.**

3.24.3. VANCOMYCIN – see Section 3.21

3.24.4. TEICOPLANIN – see Section 3.22

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3.25. MRSA Topical Decolonisation Regime:

MRSA TOPICAL DECOLONISATION REGIME

- BACTROBAN® (Mupirocin) **nasal ointment *Three times daily* in both nostrils.**
  N.B. Naseptin Nasal Cream QDS will be used where the strain of MRSA is resistant to Mupirocin.
- Hibiscrub (4% Chlorhexidine) **body wash *Once Daily***

  N.B. For alternative or chlorhexidine allergy please consult IC nurse or Pharmacy*
- Chlorhexidine **0.2% mouthwash 10ml *Twice Daily***
  N.B. For alternative or chlorhexidine allergy please consult IC nurse or Pharmacy*

The treatment course is FIVE days, stop for two days and re-screen. Restart second course only if screen positive for up to a maximum of two courses.

For persistent positive results, contact Infection Control or Microbiology for advice.

Please refer to the MRSA Policy - CPDI023

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3.26. Antibiotic Management Guidelines For MRSA Infections:

This is an additional guideline for treatment of confirmed or suspected MRSA infections, which should be used in conjunction with the current Trust Antibiotic Policy for empirical management of the infections. Treatment choices should be modified according to the antibiotic susceptibility reports. Prescribers are reminded to step down to flucloxacillin from glycopeptides (or linezolid - Microbiology approval only) where possible when the antibiotic susceptibilities of the Staphylococcus aureus strain are known. Discussion with Microbiologist is strongly recommended.

It is important to distinct MRSA colonisation from infection. Antibiotics that are active against MRSA must not be started to treat MRSA colonisation if it is not causing an infection. The MRSA topical eradication regime should be started in order to decolonise the MRSA loads carried by the patients for the protection of themselves and other severely ill patients in areas that are categorised as high-risk.

These guidelines provide the antibiotic treatment of MRSA infections for the following infections based on the recommendations from the Joint Working Party of the British Society for Antimicrobial Chemotherapy, Hospital Infection Society and Infection Control Nurses Association (JAC (2006) 57; 4: 589-608)

- Skin and Soft Tissue Infections i.e. cellulitis and surgical site infection and IV infusion site infections
- Bone and Joint Infections
- Urinary Tract Infection
- Lower Respiratory Tract Infections
- MRSA Bacteraemia
- Surgical Site Infection Prophylaxis

3.26.1. Skin and Soft Tissue Infections i.e. cellulitis and surgical site infection and IV infusion site infections:

- For superficial, non-severe infections and patients who are not at risk of bacteraemia
  - Use a combination of the **TWO** of the following oral agents. The choice of which must be guided by the antibiotic susceptibility reports; patient's renal and hepatic functions; or other medical conditions that may render the unsuitability for using the chosen drug.

    - Clindamycin PO 300mg to 450mg QDS – must not be used if MRSA is resistant to erythromycin
    - Sodium Fusidate PO 500mg TDS
    - Rifampicin PO 300mg – 600mg BD
    - Trimethoprim PO 200mg BD
    - Doxycycline PO 100mg BD

- For Severe infections and/or patients at risk of bacteraemia:

  - Vancomycin IV, dosage to be modified according to renal function and level monitoring is required – see below*
    OR
  - Teicoplanin IV if <70kg 400mg every 12 hours for 3 doses then 400mg daily. If ≥70kg 6mg/kg every 12 hours for 3 doses then 6mg/kg daily.

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- Treatment failure or slow clinical progression with monotherapy with IV glycopepetide (i.e. vancomycin and teicoplanin), consider adding Rifampicin PO 300-600mg BD or Sodium fusidate PO 500mg TDS to the IV glycopeptide treatment – discuss with Microbiologist.

OR

- Linezolid IV/PO 600mg BD – on Microbiologist or ID physician approval only

*Vancomycin level monitoring: pre-dose level should be taken prior to the 3rd or 4th dose. Target pre-dose level between 10-15 mg/L. (Note: a higher target range of 15-20mg/L might be recommended by a Microbiologist for highly resistant strains or for treatment of Infective Endocarditis)

On the day of level monitoring, take level prior to the dose, give the dose and review level prior to giving the next dose. Continue to monitor the renal function. For normal renal function, repeat levels twice weekly. For renal impairment, check levels earlier and repeat more frequently.

3.26.1.1. Topical antibiotic preparations:

- The use of topical antibiotics e.g. mupirocin, fusidic acid is discouraged due to the emergence of bacterial resistance when used in large bacterial population in the absence of any appropriate systemic therapy.
- At the discretion of the Microbiologist, appropriate topical antibiotics may be used at small superficial sites pressure sores for a maximum of 7 days – please discuss with Microbiologist for advice.

Differences between different Bactroban® topical products:

- Mupirocin 2% in paraffin base (Bactroban® Nasal Ointment) – used as part of the topical eradication regime for eradication of nasal carriage.
- Mupirocin 2% in polyethylene glycol base (Bactroban® ointment) – it is an effective agent against multi-resistant staphylococcal bacteria when applied to infected skin lesions such as eczema and small superficial pressure sores. However, it should not be used on large burns or large raw areas due to the potential absorption of the polyethylene glycol which can cause nephrotoxicity. It is also not suitable for the insertion sites of central venous catheters or other plastic devices due to the possible damage caused to the catheter material by the polyethylene glycol base.

3.26.2. Bone and Joint Infections:

Consult with Microbiologist for advice

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3.26.3. Urinary Tract Infections:

For mild and moderate – treat with one of the followings. The treatment choice depends upon the susceptibility result.

- Trimethoprim PO 200mg BD
  OR
- Nitrofurantoin PO 100mg QDS
  OR
- Doxycycline PO 200mg STAT, then 100mg DAILY

Treatment with IV glycopeptide is not usually recommended. Seek Microbiologist advice if all of the above are inappropriate.

For severe infection e.g. pyelonephritis or septicaemia – treat for 14 days
sple

- Vancomycin IV, dosage to be modified according to renal function and level monitoring is required – see below*
  OR
- Teicoplanin IV if <70kg 400mg every 12 hours for 3 doses then 400mg daily. If ≥70kg 6mg/kg every 12 hours for 3 doses then 6mg/kg daily.
  OR
- Linezolid IV/PO 600mg BD – **on Microbiologist or ID Physician approval only**

*Vancomycin level monitoring: pre-dose level should be taken prior to the 3rd or 4th dose. Target pre-dose level between 10-15 mg/L. (Note: a higher target range of 15-20mg/L might be recommended by a Microbiologist for highly resistant strains or for treatment of Infective Endocarditis)

On the day of level monitoring, take level prior to the dose, give the dose and review level prior to giving the next dose. Continue to monitor the renal function. For normal renal function, repeat levels twice weekly. For renal impairment, check levels earlier and repeat more frequently.

3.26.4. Lower Respiratory Tract Infections:

Note: MRSA isolated in sputum may represent a colonisation, as distinct from an infection. Careful clinical assessment is required in the diagnosis MRSA pneumonia / chest infection. Do not treat MRSA colonisation in sputum if patients are clinically well and have no signs of lower respiratory chest infections. Micro-organisms such as enterococci, yeasts, pseudomonas spp. and MRSA are commonly isolated as contaminants in patients previously received antibiotics.

For COPD or non-severe pneumonia without any signs of systemic infection

Doxycycline PO 200mg STAT then 100mg DAILY for 7 days

For infections in bronchiectasis without pneumonia – discuss with Microbiologist regarding antibiotic regime for MRSA

For confirmed MRSA pneumonia – in the presence of X-Ray changes and isolation of MRSA from sputum

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- Linezolid IV/PO 600mg BD – **on Microbiologist or ID Physician approval only**
  OR
- Vancomycin IV, dosage to be modified according to renal function and level monitoring is required – SEE NOTE*
  OR
- Teicoplanin IV if <70kg 400mg every 12 hours for 3 doses then 400mg daily. If ≥70kg 6mg/kg every 12 hours for 3 doses then 6mg/kg daily.

- Treatment failure or slow clinical progression with monotherapy with IV glycopepetide (i.e. vancomycin and teicoplanin), consider adding Rifampicin PO 300-600mg BD or Sodium fusidate PO 500mg TDS to the IV glycopeptide treatment – discuss with Microbiologist

*Vancomycin level monitoring: pre-dose level should be taken prior to the 3rd or 4th dose. Target pre-dose level between 10-15 mg/L. (Note: a higher target range of 15-20mg/L might be recommended by a Microbiologist for highly resistant strains or for treatment of Infective Endocarditis)

On the day of level monitoring, take level prior to the dose, give the dose and review level prior to giving the next dose. Continue to monitor the renal function. For normal renal function, repeat levels twice weekly. For renal impairment, check levels earlier and repeat more frequently.

3.26.5. MRSA Bacteraemia:

Treat for a minimum of 14 days or longer for infective endocarditis

MRSA Treatment for Confirmed MRSA Infections or Criteria For Suspected MRSA Infections

- Septic patients unresponsive to current antibiotic treatment which does not cover MRSA
- Patients with multiple admission
- Patients who are admitted from a nursing home or sheltered accommodation
- Patients who have stayed in hospital for longer than 3 days on a unit with known MRSA patients
- Patients who previously colonised with MRSA despite of latest negative screen result or currently colonised with MRSA

Send blood cultures and samples for other possible foci of infection for culture and sensitivity prior to start of treatment if possible. First antibiotic dose must be prescribed and given promptly without any delay of treatment.

- **Vancomycin** IV, dosage to be modified according to renal function and level monitoring is required – see below* (+ / - Rifampicin IV / PO 300-600mg BD on Microbiologist advice)

  OR

- Teicoplanin IV if <70kg 400mg every 12 hours for 3 doses then 400mg daily. If ≥70kg 6mg/kg every 12 hours for 3 doses then 6mg/kg daily (+ / - Rifampicin IV / PO 300-600mg BD on Microbiologist advice)

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OR

- Linezolid IV/PO 600mg BD – **on Microbiologist or ID Physician approval only**

- Consider Gentamicin IV:
    - 5mg/kg if GFR >30 mL/min
    - 3mg/kg if GFR 10 to 30 mL/min
    - if GFR less than 10 mL/min contact microbiology for advice.

  Dose based on ideal body weight max 480mg round to nearest 40mg. Prescribe as a STAT dose, if further doses are clinically indicated level monitoring MUST be done and subsequent doses must be given **at least 24 hours** after the initial dose. **See single treatment and once daily dosing guidance – section 3.23 (**see Trust Guideline for dosing and monitoring) for septic shock with hypotension or sepsis with unknown cause of origin.
- Take repeat blood cultures 48 hours after start of appropriate antibiotics (suggests high risk of metastatic infection if remains positive cultures)
- Remove or replace all removable possible foci of infection e.g. venous catheter, central line send for culture and sensitivities.
- Perform echocardiography if clinical suspicion of infective endocarditis is present. Follow the treatment guideline for infective endocarditis if diagnosed.
- Once the antibiotic susceptibilities of the Staphylococcus aureus strain are known to be Methicillin-sensitive staphylococcal aureus organisms (MSSA), it is appropriate to step down to flucloxacillin from glycopeptides (or linezolid) where possible.

*Vancomycin level monitoring: pre-dose level should be taken prior to the 3rd or 4th dose. Target pre-dose level between 10-15 mg/L. (Note: a higher target range of 15-20mg/L might be recommended by a Microbiologist for highly resistant strains or for treatment of Infective Endocarditis)

On the day of level monitoring, take level prior to the dose, give the dose and review level prior to giving the next dose. Continue to monitor the renal function. For normal renal function, repeat levels twice weekly. For renal impairment, check levels earlier and repeat more frequently.

3.26.6. Surgical Site Infection Prophylaxis:

All patients should be offered pre-operative screening for MRSA. Patients who are known to be colonised and/or infected with MRSA and are to be admitted for elective surgical and orthopaedic procedures should be given the topical MRSA decolonisation regime pre-operatively in an attempt to eradicate the MRSA carriage to prevent subsequent MRSA infection.

Current MRSA Topical Eradication Regimen – see section 3.25

Where a patient undergoing a surgical procedure is at high risk of post-operative MRSA infection, IV Vancomycin or IV Teicoplanin 400mg should be administered at induction as part of the recommended prophylaxis regimen appropriate for the procedure. For surgical procedures that last longer than 3 hours and / or with a great deal of blood loss, a further dose should be given at 2 hours.

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Patients at high risk of MRSA infections include: -

- Patients known to be colonised or infected with MRSA without documented effective eradication
- Prolonged pre-operative hospital inpatient stay
- Patients who have been admitted from a long-term care facilities e.g. nursing home, sheltered accommodation

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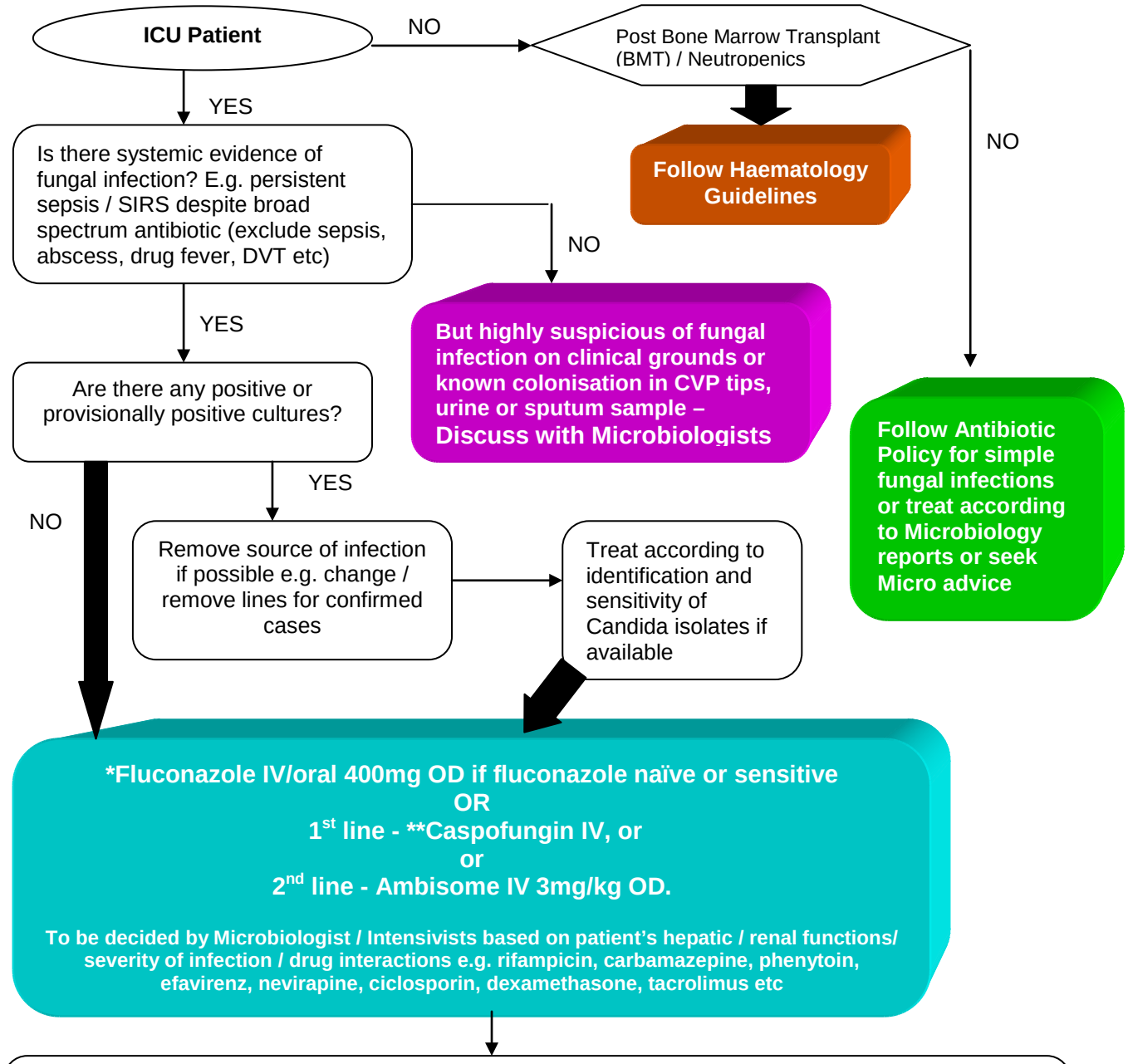
3.27. Empirical Treatment Guidelines for Fungal Infections:

3.27.1. Candida Infections:



Review every 3 to 4 days according to identification / sensitivity of the Candida, clinical improvement, other lab results and course length

All stop / continue / change of treatment must discuss with a Microbiologist.

* Modify fluconazole dose to 800mg OD if on HDx/Hfilt.e.g. CVVH

** Caspofungin dose: 70mg on Day 1 (loading), 50mg OD (<80kg) or 70mg OD (if >80kg) thereafter. Moderate to severe hepatic dysfunction: reduce the subsequent daily dose to 35mg OD. Check for drug interactions.

Notes: *Candida krusei* and *C. glabrata* are inherently resistant to Fluconazole.
Caspofungin is inherently inactive against *Zygomycetes, Cryptococcus, Fusarium and Tricosporin Spp*

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3.27.2. Serious and life-threatening Aspergillosis:

To be initiated by Haematologists or in discussion with Microbiologists or infectious disease physician ONLY

Voriconazole (Body weight > 40kg)

- **Dose:** (6mg/kg) 400mg BD (loading dose) on Day 1, then (4mg/kg) 200mg BD thereafter
- **Route:**
  - IV infusion over 2 hours, or
  - Oral (excellent oral bioavailability) - should be taken one hour before or after food

Interactions with other drugs are very common. Prescribing Voriconazole with certain drugs may be a contraindication or dosage re-adjustment and level monitoring may be required. Always check before initiation.

3.27.3. Cryptococcosis:

To be initiated by ID Consultants ONLY

Ambisome IV 3mg/kg OD following a 1mg test dose (See BNF for full guidance)

plus

Flucytosine IV 25mg/kg QDS
For at least 14 days (depending on clinical response and repeat lumbar punctures).

Monitoring requirements: renal function; FBC; Flucytosine level monitoring (pre dose level 30 – 40mg/L; 30min post dose level: 70-80mg/L)

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4. What do I need to do?

4.1 All medical staff must adhere to this Policy and prescribe the most appropriate choice of antibiotic as the empirical therapy, unless the definite causative pathogen and its sensitivities are known; any deviations and jusitification should be documented within the patient's casenotes. However, consideration must be given to recent exposure to any antibiotics, drug allergy status, renal and hepatic functions, recent Microbiology reports on sensitivities if available, MRSA status, previous history of C. difficile infection, etc.

4.2 All medical staff must review the Microbiology reports and make the appropriate modification to the empirical therapy in light of the definitive sensitivity reports.

4.3 All medical staff must consider there necessity before initiating a patient on IV antibiotics. Once initiated, the medical staff must review the IV therapy daily for timely IV to oral antibiotic switch (IVOS) when clinically feasible, except in cases of severe high risks infections where prolonged courses of IV therapy are warranted.

4.4 All medical staff must review treatment duration to avoid unduly prolonged treatment courses.

4.5 Pharmacists are responsible for monitoring practice, and will assist the medical staff for the monitoring and interpretion of drug serum levels for some antibiotics that require therapeutic drug montorings (TDM).

4.6 Medical staff and Pharmacists must ensure that antimicrobials on the Restricted List must receive appropriate approval from the Microbiology / ID Physicians.

4.7 The Antimicrobial Management Team (AMT) are responsible for compliance monitoring and for ensuring that results are reviewed and acted upon as appropriate. They will review the Policy every three years, in consultation with the Consultants, or earlier in light of any new clinical evidence or changes of national guidance.

4.8 All Consultants must advise the AMT of any treatment / practice changes in their specalist clinical areas to ensure the Policy is kept up-to-date.

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5. Abbreviations & Definitions of terms used

AmpC	Amp C Beta Lactamase
AIDS	Acquired immune deficiency syndrome
AMT	Antimicrobial Management Team
BD	twice daily
BMT	Bone marrow transplant
BNF	British National Formulary
CAP	Community-acquired Pneumonia
CDI	Clostridium difficile infection
CDT	Clostridium difficile toxin
CNS	Central Nervous System
COPD	Chronic obstructive pulmonary disease
CrCl	Creatinine Clearance
CPC	Carbapenem Producing Coliforms
CPE	Carbapenemase-producing Enterobacteriaceae
CRP	C-reactive Protein
CSF	Cerebro-Spinal Fluid
CVVH	Continous veno-venous haemofiltration
CXR	Chest x-ray
DBP	diastolic blood pressure
DFI	Diabetic Foot Infection
EDTA	Ethylenediaminetetraacetic acid
eGFR	Estimated glomerular filtration rate
ENT	Ear, Nose and Throat
ERCP	Endoscopic retrograde cholangiopancreatography
ESBL	Extended spectrum Beta Lactamase
FBC	Full Blood Count
FGH	Fairfield General Hospital
g	gram
GI	Gastro-intestinal
GMCCN	Greater Manchester & Cheshire Cancer Network
GP	General Practitioner
GUM	Genito urinary Medicine
h	hour
HAP	Hospital-acquired Pneumonia
HCAI	Healthcare-associated Infection
HCL	hydrochloride
HDx/Hfilt	Haemodialyis/haemofiltration
HIB	Haemophilus influenzae type B
hrs	hours
HSV	herpes simplex virus
KPI	Key performance indicators

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IBW	Ideal Body Weight
ICU	Intensive Care Unit
ID	Infectious Diseases
IE	Infectious Endocarditis
IM	intramuscular
IV	Intravenous
IVOS	IV to Oral Switch
Kg	kilogram
kPa	kilopascal
LFTs	Liver Function Tests
mg	milligram
min	minute
ml	millilitre
mmHg	millimeter of mercury
mmol	millimole
MRSA	Methicillin-resistant Staphylococcus aureus
MSU	Mid Stream Urine
NBM	Nil by mouth
NG	Naso-gastro
NICE	National Institute of Health & Care Excellence
NMGH	North Manchester General Hospital
PAHT	Pennine Acute Hospital Trust
PaO2	Partial pressure of oxygen
PCR	Polymerase Chain Reaction
PEG	Percutaneous endoscopic gastrostomy
PID	Pelvic Inflammatory Disease
PO	orally/by mouth
QDS	four times daily
RCA	Route Cause Analysis
RI	Rochdale Infirmary
RTA	Road Traffic Accident
SaO2	Arterial oxygen saturation
SBP	systolic blood pressure
SIGN	Scottish Intercollegiate Guidelines Network
SSI	Surgical Site Infection
STAT	statim/immediately
STI	Sexually Transmitted Infection
TACE	Transcatheter arterial chemoembolisation
TDM	Therapeutic Drug Monitoring
TDS	Three times daily
TMA	Transcription mediated amplification
TRUS	Transrectal ultrasonography
TROH	The Royal Oldham Hospital
TURP	Transurethral resection of the prostate

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UTI	Urinary Tract Infection
VAP	Ventilator-associated Pneumonia
VZV	Varicella zoster virus
WBC	White Blood Cell Count
WFI	Water for injection
Wgt	weight

6. References and Bibliography

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7. Appendices

See below

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Appendix 1 – Equality Impact Assessment

The Pennine Acute Hospitals NHS Trust

Equality Impact Assessment for Antibiotic Policy for Adult Patients EDT007 V6

For each of the Protected Characteristics & equality & diversity streams listed answer the questions below using Y to indicate yes and N to indicate no:	Age	Disability	Ethnicity / Race	Gender	Gender Reassignment	Marriage & Civil Partnership	Pregnancy & Maternity	Religion/belief	Sexual orientation	Human Rights	Carers	Please explain your justification
1. Does the practice covered have the potential to affect individuals or communities differently or disproportionately, either positively or negatively (including discrimination)?	N	N	N	N	N	N	N	N	N	N	N	This policy is intended for all adults and therefore does not discriminate against of the protected characteristics.
2. Is there potential for, or evidence that, the proposed practice will promote equality of opportunity for all and promote good relations with different groups?	N	N	N	N	N	N	N	N	N	N	N	This policy is intended for all adults and therefore does not discriminate against of the protected characteristics.
3. Is there public concern (including media, academic, voluntary or sector specific interest) in the document about actual, perceived or potential discrimination about a particular community?	N	N	N	N	N	N	N	N	N	N	N	This policy is intended for all adults and therefore does not discriminate against of the protected characteristics.

Your Name: Emma Hughes	**Your Designation: Senior Clinical Pharmacist**	**Signed*:** 	**Date: 18.7.17**

To be completed by the relevant Equality Champion following satisfactory completion & discussion of answers above with author

Equality Champion: MS Davis	**Directorate: Estates & Facilities**	**Signed*:** 	**Date:** 18.7.17

*Please scan or insert electronic signature

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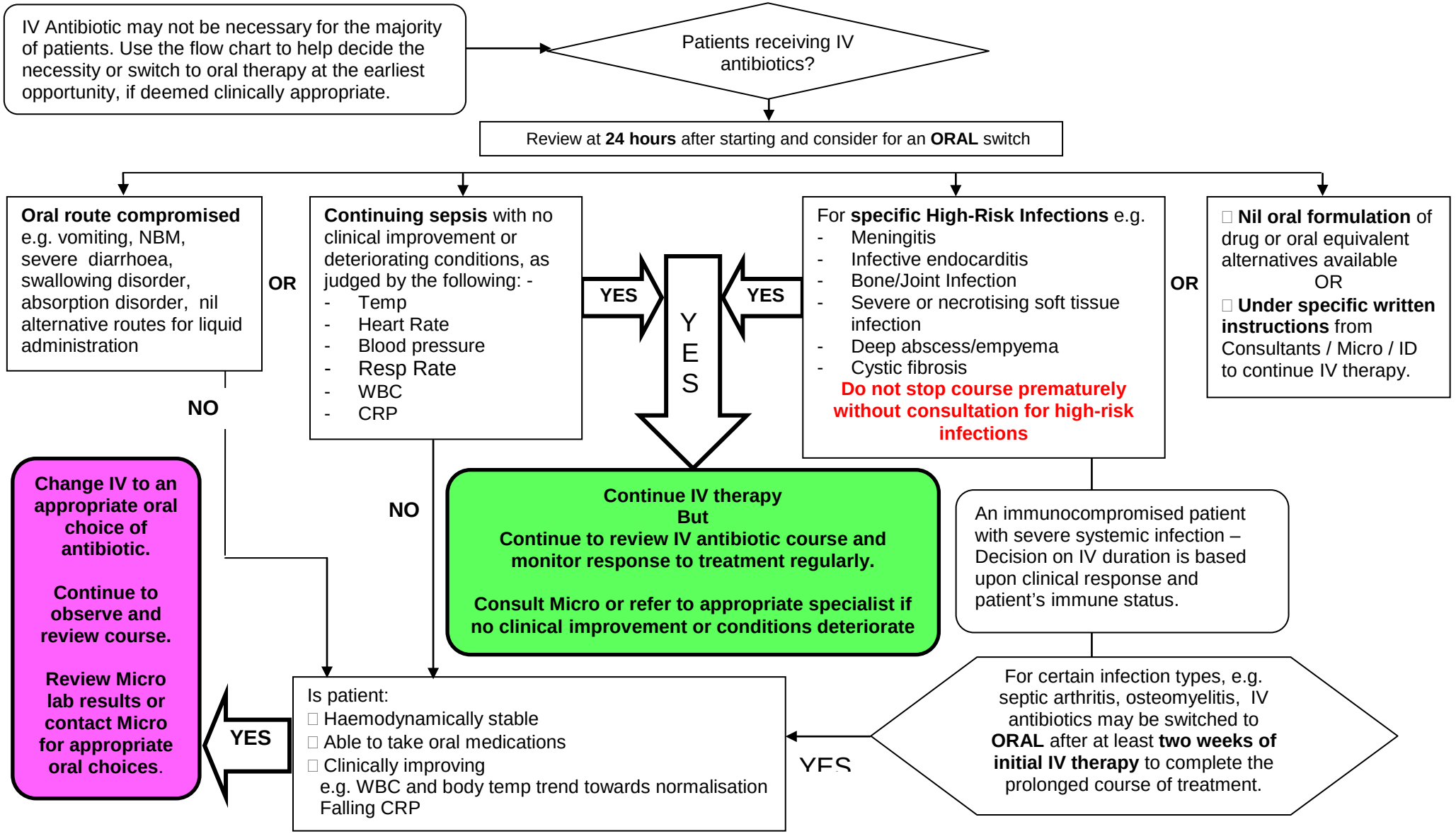
The Pennine Acute Hospitals NHS Trust

Appendix 2 - IV to Oral Antibiotic Switch Flow Chart

Refer to the Guidance on IV to Oral Antibiotic Switch for more detailed information.



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Appendix 3 – Patient information leaflet for Ciprofloxacin for Prophylaxis of Meningococcal Disease

Ciprofloxacin

Why have I been given ciprofloxacin?

The medication that you have been given is called ciprofloxacin. Ciprofloxacin is an antibiotic that is frequently used to treat a number of different conditions. It is recommended in the national guidelines that the close contacts of someone with meningococcal disease should receive prophylactic (preventative) antibiotics, such as ciprofloxacin. The meningococcal germs that cause meningitis and septicaemia can be carried in the nose and throat. This antibiotic will kill them.

How should I take ciprofloxacin?

Ciprofloxacin is available as a liquid or a tablet. Depending on your age you will receive either one or two tablets of ciprofloxacin or one dose of a liquid. You should take the tablets or liquid as a one-off dose. Tablets should be taken with water. It is important to drink plenty of fluids for the rest of the day after taking this antibiotic.

Please tell your doctor or nurse if you are:

- allergic to ciprofloxacin
- have a history of epilepsy or G6PD deficiency.

so that they can arrange an alternative medication for you.

You should avoid drinking alcohol with this medication as it may make you drowsy, affecting your ability to drive or to operate machinery.

Do not take the ciprofloxacin tablet(s) or liquid if you have taken antacids, indigestion medicines or preparations containing iron or mineral supplements within the last four hours. Please see your doctor or nurse if this is the case.

What are the side effects of ciprofloxacin?

The side effects of ciprofloxacin may include:

- tummy ache, diarrhoea and nausea
- tiredness and headaches
- rash and itching
- **facial swelling** – very rarely breathing difficulties may occur with the facial swelling. **N.B. you should seek medical attention urgently if this occurs.**
- pain and inflammation around the joints.

Does ciprofloxacin interfere with the contraceptive pill?

Ciprofloxacin does not interfere with the contraceptive pill.

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Appendix 4 – Patient information leaflet for Rifampicin for Prophylaxis of Meningococcal Disease

Rifampicin

Why have I been given rifampicin?

The medication that you have been given is called rifampicin. Rifampicin is an antibiotic that is frequently used to treat a number of different conditions. It is recommended in the national guidelines that close contacts of someone with meningococcal disease should receive prophylactic (preventative) antibiotics, such as rifampicin. The meningococcal germs that that cause meningitis and septicaemia can be carried in the nose and throat. This antibiotic will kill them.

How should I take rifampicin?

Rifampicin is available as a liquid or a tablet and is suitable for people of all ages. Rifampicin must be taken twice a day (morning and evening) for two days, the instructions will be clearly written on the box or bottle. It is important that you take a two-day course. Rifampicin is taken by mouth and should be taken one hour before a meal to obtain the best effect. If you are taking the syrup, there may be some left in the bottle at the end of the course, this should be disposed of safely.

Please tell your doctor or nurse if you:
- are allergic to rifampicin
- take any medication

as you may need an alternative medicine.

What are the side effects of rifampicin?

The side effects of rifampicin include:
- orange / reddish staining of urine, saliva and tears. **This is normal so do not be alarmed.** Rifampicin may permanently stain some contact lenses so you should not wear contact lenses whilst on treatment or for the following week
- tummy upset, diarrhoea and nausea
- skin flushing and itching, with or without a rash
- very rarely, jaundice (yellowing of the skin or whites of the eyes).

Does rifampicin effect other medications?

Rifampicin may reduce the effect of several medications including:
- blood thinning medicines (anticoagulants)
- diabetic medication
- some types of epilepsy medication (anticonvulsants).

Rifampicin can interact with oral contraceptives. If you are taking an oral contraceptive pill, you should use an additional method of birth control (such as a condom) as well as your oral contraceptive pill during treatment with rifampicin and for at least 4 weeks after finishing treatment.

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