Mid Essex Hospital Services NHS
NHS Trust

Antibiotic Policy for Adults	**Clinical Guideline** **Register No: 06045** **Status: Public**

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Table of Contents

1. Purpose

1.1 The purpose of this policy is to provide all clinical staff with guidance, to assist them in meeting the specific needs of patients.

1.2 The aim of these adult guidelines is to optimise antimicrobial prescribing within Mid Essex Hospitals Service NHS Trust. Antimicrobials are over-prescribed in many health institutions and Mid Essex is not exempt. These guidelines attempt to provide the best quality of evidence-based care to manage patients with infections, and also reduce the incidence of Healthcare Associated Infections, antimicrobial resistance and to minimise cost.

2. Scope

2.1 This policy applies to all staff who are involved in the care and treatment of adults with either a suspected or confirmed diagnosis

3. Staffing and Training

3.1 Antimicrobial stewardship training and competency assessment is undertaken for all in-coming junior doctors. Nurse and pharmacy training is regularly undertaken.

4. Introduction

4.1 Antimicrobial Resistance

4.1.1 In 2013, the Chief Medical Officer, Professor Dame Sally Davies said: *'Antimicrobial resistance poses a catastrophic threat. If we don't act now'*

4.1.2 The five-year antimicrobial resistance strategy (DH September 2013) outlines steps being taken to improve how we prevent and manage infections in people and in animals including:

- Better hygiene and monitoring of bacteria in medical and community settings
- Improving education and training around the prescribing of antibiotics
- Reducing inappropriate usage and make sure patients get the right antibiotics, at the right time and for the right duration
- Collecting better data on the resistance of bugs so we can track them more effectively
- Identifying the most resistant bacteria and step in earlier where there is resistance to antibiotics

4.2 Choice of a suitable drug

4.2.1 Before selecting an antibacterial the clinician must first consider two factors: the patient and the known or likely causative organism. Factors related to the patient include weight, history of allergy, renal and hepatic function, susceptibility to infection (i.e. whether immune-compromised), ability to tolerate drugs by mouth, severity of illness, ethnic origin, age, whether taking other medication and, if female, whether pregnant, breast-feeding or taking an oral contraceptive.

4.2.2 The known or likely organism and its antibacterial sensitivity, in association with the above factors, will suggest one or more antibacterials, the final choice depending on the microbiological, pharmacological, and toxicological properties.

4.2.3 The principles involved in selection of an antibacterial must allow for a number of variables including changing renal and hepatic function, increasing bacterial resistance, and information on side-effects. Duration of therapy, dosage, and route of administration depend on site, type and severity of infection and response.

4.2.4 For further advice on specific patient groups (e.g. patients with renal or hepatic impairment or pregnant or breast feeding women), please contact your pharmacist or Medicines Information (extension 4822).

4.3 Restricted Antimicrobials

4.3.1 The prescribing of certain antimicrobial agents is restricted for the following reasons:

- To minimise the emergence of resistance to these agents
- To minimise the risk of health care associated infections
- More suitable alternatives are available that are less toxic and less expensive

4.3.2 Below is a list of antimicrobial agents that are 'fully restricted' and may only be used after consultation and agreement with a Consultant Microbiologist.

- Daptomycin
- Fidaxomicin
- Linezolid
- Temocillin
- Tigecycline

4.3.3 The following list of broad spectrum antimicrobials should be prescribed for approved indications within this guideline. Where they are prescribed for an indication not in this guideline, there should be documented clear clinical justification and must be reviewed and approved by a registrar or consultant on their ward round.

- All cephalosporins
- Co-amoxiclav
- Ciprofloxacin
- Piperacillin/Tazobactam (Tazocin)
- Meropenem

1.3.4 Trends in the usage of restricted antimicrobials will be monitored over time. The usage (defined daily doses used) of co-amoxiclav, piperacillin/tazobactam and meropenem will be monitored and reported in the Director of Infection Prevention and Control (DIPC) Report each quarter.

4.4 Start Smart – Then Focus

4.4.1 Start Smart is:

- Do not start antibiotics in the absence of clinical evidence of bacterial infection
- If there is evidence/suspicion of bacterial infection, use local guidelines to initiate prompt effective antibiotic treatment
- Document on drug chart and in medical notes: clinical indication, duration or review date, route and dose
- Obtain cultures first
- Prescribe single dose antibiotics for surgical prophylaxis; only where antibiotics have been shown to be effective

4.4.2 Then Focus is:

- Review the clinical diagnosis and the continuing need for antibiotics by 48 hours and make a clear plan of action - the "Antimicrobial Prescribing Decision"
- The **five Antimicrobial Prescribing Decision options** are: Stop, Switch IV to Oral, Change, Continue and Outpatient Parenteral Antibiotic Therapy (OPAT).
- It is essential that the review and subsequent decision is clearly documented in the medical notes**.**

5. Prescribing Checklist

5.1 Before prescribing an antimicrobial there are **6 fundamental questions** that should be considered:

- Is the patient infected with a bacterial agent and if so, where is it?
- Are empirical antimicrobials necessary?
- How can we make a microbiological diagnosis?
- What is the most appropriate antimicrobial therapy and how should it be given?
- How can we monitor therapy?
- What is the duration of antimicrobial therapy?

5.2 Antibiotics should be prescribed for 5 days unless specified otherwise on consultant ward round.

6. Penicillin Allergy

6.1 The diagnosis of penicillin allergy is often accepted without obtaining a detailed history of the patient's reaction. As a result, penicillins may unnecessarily be withheld from some patients who do not have a true allergy. This may adversely affect their clinical outcome

6.2 The clinical symptoms of a true Type I allergy to penicillin are urticaria, laryngeal oedema, bronchospasm, hypotension, or local swelling within 72 hours of administration or development of a pruritic rash even after 72 hours. These patients should not receive a penicillin.

6.3 Patients with a history of intolerance to penicillin e.g. gastro-intestinal upset, after administration are probably not truly allergic to penicillin.

6.4 The frequently cited figure of 10% cross-reactivity between penicillins and cephalosporins is thought to be an overestimate. The true incidence of cross-sensitivity is uncertain but now considered to be 0.5-6.5% (BNF68, September 2014). It is thought that first generation cephalosporins have a greater risk of cross-sensitivity than second or third generation cephalosporins.

6.5 Throughout this policy, every attempt has been made to provide alternative antimicrobials for patients who have a genuine penicillin allergy. If no alternative is given, or for allergies to other antimicrobials, please discuss with the consultant microbiologist or pharmacist.

6.6 To aid prescribing of antimicrobials for patients with a history of penicillin allergy, a traffic-light system is used throughout this policy (See Appendix 1 for full guide):

- **Antimicrobials appearing in RED are CONTRA-INDICATED in patients with a true penicillin allergy**
- **Antimicrobials appearing in AMBER should be used WITH CAUTION in patients with non-type 1 allergy to penicillin**
  DO NOT USE *in patients with* ***Type 1*** *penicillin allergy (anaphylaxis, breathing difficulties, facial swelling, urticarial rash or other major skin reactions). If in doubt contact the on-call Consultant Microbiologist via switch board*
- **Antimicrobials appearing in GREEN are safe to use in patients with a penicillin allergy.**

7. Respiratory Tract Infections

7.1 Upper Respiratory Tract infection

Usually viral aetiology

7.2 Community Acquired Pneumonia (CAP)

7.2.1 Diagnosis

When assessing patients with community acquired pneumonia (CAP), consider:

- Lobar or segmental consolidation on chest x-ray
- Severity of infection based on clinical judgement supported by CURB-65 severity score - always document in the medical notes.

CURB-65 score (1 point for each) • **C**onfusion (acute onset) • **U**rea > 7mmol/L • **R**espiratory rate ≥ 30/min • **B**lood pressure (SBP < 90mmHg or DBP ≤ 60mmHg) • Age **≥ 65**	**Low Severity**: CURB-65= 0-1 **Moderate Severity**: CURB-65= 2 **High Severity**: CURB-65= 3+

7.2.2 Whilst awaiting senior review in moderate to high severity CAP, do not delay giving initial antibiotics, which should be administered within 4 hours of presentation.

7.2.3 Empiric Treatment of CAP

Infection	Likely pathogen	1st line	Alternative	Duration	Notes
Community acquired pneumonia. ***Low Severity*** *CURB-65: 0-1*	*Strep. pneumoniae*	Amoxicillin PO 500mg 8-hourly **OR** Benzylpenicillin IV 1.8g 6-hourly	Clarithromycin PO 500mg 12-hourly **OR** Doxycycline PO 200mg STAT, then 100mg OD **+/-** Rifampicin PO 300mg 12-hourly	7 days	Risk of aspiration Add metronidazole PO 400mg 8-hourly (or IV 500mg 8-hourly) Oral switch • Benzylpenicillin IV → amoxicillin PO 500mg-1g 8-hourly
Community acquired pneumonia. ***Moderate Severity*** *CURB-65: 2* *Start antibiotics and seek senior review*	*Step. Pneumoniae;* *Mycoplasma* *Less commonly:* *Legionella*	Amoxicillin PO 500mg 8-hourly **OR** Benzylpenicillin IV 1.8g 6-hourly **+/-** Clarithromycin PO/IV 500mg 12-hourly	Clarithromycin PO 500mg 12-hourly **OR** Doxycycline PO 200mg 12-hourly for 48 hours, then 100mg 12-hourly. **+/-** Rifampicin PO 300mg 12-hourly	7 days Longer if atypical organisms confirmed.	Risk of aspiration Add metronidazole PO 400mg 8-hourly (or IV 500mg 8-hourly) Oral switch • Benzylpenicillin IV → amoxicillin PO 500mg-1g 8-hourly
Community acquired pneumonia. ***High Severity*** *CURB-65: 3+* *Start antibiotics and seek senior review*	*Strep. pneumoniae* *Mycoplasma* *Less commonly:* *Legionella*	Benzylpenicillin IV 1.8g 6-hourly **+** Clarithromycin IV 500mg 12-hourly	Chloramphenicol IV 12.5mg/kg (max 1g) 6-hourly **+/-** Gentamicin NEB 80mg 12-hourly **OR** **Vancomycin IV continuous infusion (see IV vancomycin protocol) + Clarithromycin IV 500mg 12-hourly *** for vancomycin dosing see Appendix 5*	7-10 days. Extend duration according to clinical judgement.	*Monitoring of renal function is not required for nebulised gentamicin.* Risk of aspiration Add metronidazole PO 400mg 8-hourly (or IV 500mg 8-hourly) Oral switch • Benzylpenicillin IV → amoxicillin PO 500mg-1g 8-hourly • Chloramphenicol IV → doxycycline PO 100mg 12-hourly • Vancomycin IV → discuss with micro
Confirmed aspiration pneumonia (community acquired)	*Coliforms* *Anaerobes*	Co-amoxiclav IV 1.2g 8-hourly	As above **+** Metronidazole IV 500mg 8-hourly or PO 400mg 8-hourly.	7 days	Oral switch Switch to oral as soon as clinical condition permits. • Co-amoxiclav 1.2g IV 8-hourly → co-amoxiclav PO 625mg 8-hourly

7.3 Hospital Acquired Pneumonia (HAP)

7.3.1 Pneumonia developing over 48 hours after hospital admission.

The BTS recommend that although the clinical diagnosis of HAP is difficult, to identify patients in whom pneumonia should be considered in the differential diagnosis, the following criteria can be used:

- Purulent tracheal secretions, and new and/or persistent infiltrate on chest x-ray, which is otherwise unexplained
- Increased oxygen requirement
- Core temperature >38.3^{o}C
- Blood leucocytosis (>10,000/mm^{3}) or leucopenia (<4000/mm^{3})

7.3.2 Empiric Treatment of HAP

Infection	Likely pathogen	1st line	Alternative	Duration	Notes
HOSPITAL ACQUIRED PNEUMONIA (HAP) *Mild to moderate*	*S. aureus*	Doxycycline PO 200mg STAT, then 100mg OD **+/-** Rifampicin PO 300mg 12-hourly **plus** Gentamicin NEB 80mg 12-hourly	Contact consultant microbiologist	If good response – 7 days.	*Monitoring of renal function is not required for nebulised gentamicin.*
HOSPITAL ACQUIRED PNEUMONIA (HAP) *Severe*	*Pseudomonas* *E.coli* *Klebsiella* *S. aureus*	Piperacillin/tazobactam IV 4.5g 8-hourly **plus** Gentamicin NEB 80mg 12-hourly if MRSA possible: **add** **Vancomycin IV continuous infusion	Contact consultant microbiologist if MRSA possible: **add** **Vancomycin IV continuous infusion	If good response – 7 days.	Is aspiration pneumonia probable: **Add** Metronidazole IV 500mg 8-hourly or PO 400mg 8-hourly *Monitor renal function and vancomycin levels. See vancomycin IV protocol.*

*** for vancomycin dosing see Appendix 5*

7.4 Treatment of Microbiologically Confirmed Pneumonia

Pathogen	1st line	Alternative	Duration	Notes
Streptococcus pneumoniae	Amoxicillin PO 500mg-1g 8-hourly OR Benzylpenicillin IV 1.8g 6-hourly	Clarithromycin PO/IV 500mg 12-hourly (if sensitive)	7 Days	
Mycoplasma pneumoniae *Chlamydophilia pneumoniae* *Chlamydia psittaci* *Chlamydia burnetii*	Clarithromycin PO/IV 500mg 12-hourly	Doxycycline PO 200mg STAT, then 100mg OD	14 days	
Legionella species	Ciprofloxacin PO 500mg 12-hourly (or if IV indicated, Ciprofloxacin IV 400mg 12-hourly) +/- Rifampicin PO/IV 300mg 12-hourly	Clarithromycin PO/IV 500mg 12-hourly +/- Rifampicin PO/IV 300mg 12-hourly	7-10 days	
Haemophilus influenza	Co-amoxiclav PO 625mg 8-hourly Or co-amoxiclav IV 1.2g 8-hourly	Doxycycline PO 200mg STAT, then 100mg OD OR Ciprofloxacin 500 mg bd	5 days	
Pseudomonas aeruginosa	Piperacillin/Tazobactam IV 4.5g 8-hourly + Gentamicin NEB 80mg 12-hourly	Ciprofloxacin PO 500-750mg 12-hourly + Gentamicin NEB 80mg 12-hourly		
Staphylococcus aureus (non-MRSA)	Flucloxacillin IV 1-2g 6-hourly +/- Rifampicin PO/IV 300mg 12-hourly	**Vancomycin IV continuous infusion +/- Rifampicin PO/IV 300mg 12-hourly + Gentamicin NEB 80mg 12-hourly	10 days	
Staphylococcus aureus (MRSA)	**Vancomycin IV continuous infusion +/- Rifampicin PO/IV 300mg 12-hourly+ Gentamicin NEB 80mg 12-hourly		10 days	Linezolid may be used on approval of consultant microbiologist.

*** for vancomycin dosing see Appendix 5*

Pathogen	1st line	Alternative	Duration	Notes
Pneumocystis jiroveci Pneumonia (PCP)	Co-trimoxazole IV 120mg/kg daily in 2-4 divided doses for the first 3 days, then 90mg/kg in 2-4 divided doses for 18 days	Clindamycin PO 450mg 6-hourly plus primaquine PO 15mg (base) OD	3 weeks	The dose reduction from 120 mg/kg/day to 90 mg/kg/day has equivalent efficacy but a lower incidence of adverse events than continuous use of the higher dose. Oral Switch Co-trimoxazole oral dose is the same as IV dose. Co-trimoxazole **must NOT be co-prescribed with methotrexate** G6PD status must be checked before prescribing primaquine or co-trimoxazole.
Pneumocystis jiroveci prophylaxis in immunocompromised patients (e.g. HIV)	Co-trimoxazole PO 960mg OD (Three times a week)		On-going	

7.5 Acute Exacerbation of COPD

7.5.1 Diagnosis and management

- Increased shortness of breath, wheeze, sputum volume, in a patient with a known diagnosis or clinical picture consistent with COPD
- If none of these features present (purulent sputum, fever, raised CRP), patients can be managed safely without antibiotics.

7.5.2 Empiric Treatment of Infective Exacerbation of COPD

Infection	Likely pathogen	1st line	Penicillin Allergy	Duration	Notes
Acute exacerbation of COPD (increased SOB, wheeze, sputum volume or purulence, raised CRP, fever)	*Strep. Pneumonia* *H. influenza*	Co-amoxiclav PO 625mg 8-hourly ***or** (if poor response)* Moxifloxacin* PO 400mg OD	Doxycycline PO 200mg STAT, then 100mg OD **+/-** Rifampicin PO 300mg 12-hourly ***or** (if poor response)* Moxifloxacin* PO 400mg OD	7-10 days	*For patients failing to respond to treatment, perform sputum culture and discuss with a Consultant Microbiologist or Respiratory Physician.* ***Note**: Moxifloxacin is contra-indicated in patients with risk factors for QT interval prolongation*

7.6 Acute Exacerbation of Asthma

7.6.1 Management

- Bacterial infections are an uncommon cause of asthma exacerbations. The vast majority of patients do not require antibiotics unless there is co-existent bronchiectasis.

- Antibiotics are not recommended unless very clear evidence of infection i.e. raised CRP, purulent sputum, fever, consolidation – then treat as LRTI.

- Raised white cell count alone is not a specific marker of infection particularly in the presence of prior steroid treatment.

8. Tuberculosis

To be read in conjunction with NICE guidance on Tuberculosis (March 2011) – access via http://www.nice.org.uk/guidance/cg117

8.1 Tuberculosis (TB) is an infectious disease caused by bacteria belonging to the *Mycobacterium tuberculosis* complex.

8.2 Patients diagnosed with active TB should be referred to a physician with training and experience in treating patients with TB.

8.3 All patients with suspected or confirmed respiratory TB should be given a single room.

8.4 TB is a notifiable disease and the Infection Control Team should be informed of every suspected or confirmed case.

8.5 All patients with TB should be offered an HIV test.

8.6 Prior to the commencement if anti-TB treatment, LFTs should be performed and visual acuity and colour perception should be documented.

8.7 The standard recommended treatment regimen for management of respiratory *Mycobacterium tuberculosis* is a 6 month course of quadruple therapy including a 2 month initial phase and a 4 month continuation phase (see table below).

8.8 For patients with meningeal TB the continuation phase should be extended to 10 months (12 months total treatment). A glucocorticoid is also recommended (refer to NICE guidance).

1st Line	Alternative	Duration	Comments
Rifater: < 40kg: 3 tablets daily 40-49kg: 4 tablets daily 50-64kg: 5 tablets daily ≥65kg: 6 tablets daily **plus** **Ethambutol** 15mg/kg daily	**Rifinah-150/100**: < 50kg: 3 tablets daily or **Rifinah – 300/150:** ≥50kg: 2 tablets daily **plus** **Pyrazinamide** <50kg 1.5g daily ≥50kg 2g daily **plus** **Ethambutol** 15mg/kg daily	Initial: 2 months	**Rifater** and **Rifinah** are best given before breakfast to increase absorption. **Rifater** contains rifampicin, isoniazid, and pyrazinamide. **Rifinah** contains rifampicin and isoniazid.
Rifinah – 150/100 < 50kg 3 tablets daily **or** **Rifinah – 300/150** ≥50kg 2 tablets daily		Continuation: 4 months	For patients with meningeal TB, extend the continuation phase to 10 months (i.e. total duration 12 months) and give glucocorticoid (see NICE guideline)

The above treatment regimen is for infection with *Mycobacterium tuberculosis* and is not appropriate for drug resistant TB. In such cases specialist advice should be sought.

9. Urinary Tract Infections

9.1 Empiric Treatment for Lower Urinary Tract Infections

Likely Pathogens	1st line	Alternative	Duration	Notes
E coli *Klebsiella* *Proteus* *Enterococci*	Trimethoprim PO 200mg 12-hourly *Avoid Trimethoprim in 1st trimester of pregnancy - fetal teratogenicity* <u>Pregnancy</u> Cefalexin PO 500mg 8-hourly	Nitrofurantoin PO 50mg 6-hourly *Avoid Nitrofurantoin in 3rd trimester of pregnancy - fetal teratogenicity*	**3 days** treatment is usually adequate if uncomplicated infection in women. Use for **7 days in men** and the elderly. **7 days**	• Review urine culture results • Nitrofurantoin should not be used in renal impairment (eGFR<45ml/min) or pyelonephritis, and is contra-indicated in G6PD deficiency • **Trimethoprim must NOT be co-prescribed with methotrexate –** increased risk of bone marrow suppression. • Asymptomatic bacteriuria detected during pregnancy **should** also be treated with an antibiotic.

9.2 Resistant, Persistent or Upper Urinary Tract Infection

Infection	1st Line	Alternative	Duration	Comments
Acute Pyelonephritis *Gram negative organisms* *E.coli* *Proteus* *Klebsiella*	Co-amoxiclav IV 1.2g TDS **+/-** *Gentamicin IV once daily dosing	Ciprofloxacin PO 500-750mg 12-hourly *if NBM or not absorbing give ciprofloxacin IV 400mg 12-hourly* **Or** *Gentamicin IV once daily dosing	7-10 days (max 5 days with *gentamicin IV)	These are the ideal antibiotics because of their renal penetration. **for gentamicin dosing see Appendix 3* <u>Oral switch:</u> Co-amoxiclav IV 1.2g → PO 625mg TDS Ciprofloxacin IV 400mg → PO 500mg 12-hourly
MRSA	Doxycycline PO 100mg 12-hourly +/- Rifampicin PO 300mg 12-hourly **OR** <u>With systemic sepsis:</u> **Vancomycin IV continuous infusion		7 days <u>With systemic sepsis:</u> 14 days	• Also initiate MRSA decontamination protocol *** for vancomycin dosing see Appendix 5*
ESBL producing bacteria	Meropenem IV 1-2 g 8 hourly	If severe type-1 allergy to penicillin discuss with microbiology	7-10 days	Ertapenem IV 1g OD is an alternative if sensitive

9.3 Infection in Catheterised Patients

Pathogen	1st line	Alternative	Duration	Notes
Complete spectrum of organisms	**Do not treat** unless symptomatically unwell. Otherwise selection for resistant organisms will occur. If treatment necessary on clinical grounds, a change of catheter is essential and treat according to sensitivities.			• Dipstick testing is invalid in catheterised patients. • Do not routinely prescribe antibiotic prophylaxis to prevent symptomatic UTI in patients with catheters.

10. Genito-Urinary Infection

Infection	Likely pathogen	1st line	Alternative	Duration	Notes
Prostatitis	Usually Gram negative organisms e.g. *E.coli, Proteus spp, Klebsiella spp.*	Ciprofloxacin PO 500mg 12-hourly Or Trimethoprim PO 200mg 12-hourly	If parenteral therapy is required: Ceftriaxone IV 2g OD +/- *Gentamicin IV once daily dosing	28 days (max 5 days with gentamicin IV)	• Treatment of sexual partners is **not** required • Avoid quinolones in patients who have epilepsy or at risk of seizures. • **Trimethoprim must NOT be co-prescribed with methotrexate –** increased risk of bone marrow suppression. **for gentamicin dosing see Appendix 3*
Epididymo-orchitis	Enteric organisms suspected	Ciprofloxacin PO 500mg 12-hourly		10 days	
	Any sexually transmitted pathogen suspected	Ceftriaxone IM 500mg STAT **plus** Doxycycline PO 100mg bd	Tetracycline allergy: Ofloxacin PO 200mg 12-hourly	10-14 days 14 days (ofloxacin)	
	If chlamydia or other non-gonococcal organism suspected	Doxycycline PO 100mg bd	Tetracycline allergy: Ofloxacin PO 200mg 12-hourly	10-14 days 14 days (ofloxacin)	

11. Septicaemia

11.1 It is vital to establish the primary source of septicaemia, and control this. Blood cultures should be taken aseptically BEFORE antimicrobial therapy and antibiotics given with one hour of a sepsis diagnosis.

11.2 Treatment of Septicaemia

Diagnosis	1st Line	Alternative	Notes
Systemic infection of unknown origin and neutropenic sepsis	Piperacillin/tazobactam IV 4.5g 6-hourly **+/-** * Gentamicin IV (once daily dosing)	Meropenem IV 1-2g 8 hourly	
Group A Streptococcus	Benzylpenicillin IV 1.8-2.4g 6 hourly **plus** Clindamycin IV 600mg-1.2g 6-hourly	**Vancomycin IV continuous infusion **Plus** Clindamycin IV 600mg-1.2g 6-hourly	Antimicrobials should be rationalised according to blood culture results.
Streptococcus pneumoniae or *Neisseria meningitidis*	Benzylpenicillin IV 1.8-2.4g 6-hourly	Chloramphenicol IV 25mg/kg (max 1g) 6-hourly, reducing to 12.5mg/kg 6-hourly as soon as clinically indicated	
Intra-abdominal sepsis e.g. Coliforms, anaerobes and sometimes Enterococci	Co-amoxiclav IV 1.2g 8 hourly +/- *Gentamicin IV once daily dosing **plus** Metronidazole IV 500mg 8 hourly	Meropenem IV 1-2g 8-hourly	
Wide range of organisms: Streptococci, *S.aureus*, MRSA and Coliforms	**Vancomycin IV by continuous infusion **plus** *Gentamicin IV once daily dosing	**Vancomycin IV continuous infusion **plus** Ciprofloxacin IV 400mg 12-hourly	Rationalisation of antibiotics should follow ASAP pending culture results.
Coagulase-negative Staphylococci *S.aureus* MRSA, others	**Vancomycin IV by continuous infusion **plus** Piperacillin/tazobactam IV 4.5 g 6-8 hourly		Obtain blood culture from line + peripheral site. Consider removal of line.

**for gentamicin dosing see Appendix 3*
***for vancomycin dosing see Appendix 5*

12. Endocarditis

12.1 Management

12.1.1 An accurate diagnosis is very important. If a patient has not been on antibiotics before, take three sets of blood cultures from different peripheral sites before starting antibiotics. If patient is on antibiotics consider stopping these so that a diagnosis can be made. Take six sets of blood cultures over 48 – 72 hour period. Strict attention to the aseptic process is essential. Accompany blood cultures by 10mls-clotted blood for culture negative serology and EDTA blood for PCR testing.

12.1.2 If a patient with suspected IE is clinically stable, wait for the blood culture results before commencing on any antimicrobials.

12.1.3 Choice of antimicrobials should be based on severity of infection, type of valve affected and risk factors for unusual or resistant pathogens.

12.1.4 Review antibiotic choice and duration with culture results.

12.1.5 The following charts provide an empirical treatment regimen and specific treatment as appropriate. To be read in conjunction with the BSAC guidelines for the diagnosis and antibiotic treatment of endocarditis in adults.

12.2 Empirical treatment regimens for endocarditis (pending blood culture results)

Antimicrobial	Dose/route	Comment
1. NVE-indolent presentation		
Amoxicillin AND Gentamicin[a] (optional)	2 g q4h iv 1 mg/kg q12h iv	• If patient is stable, ideally await blood cultures. • Better activity against enterococci and many HACEK microorganisms compared with benzylpenicillin. • Use Regimen 2 if genuine penicillin allergy. • The role of gentamicin is controversial before culture results are available.
2. NVE, severe sepsis (no risk factors for Enterobacteriaceae, *Pseudomonas*)		
Vancomycin[a] AND Gentamicin[a]	Dosed according to local guidelines 1mg/kg q12h iv	• In severe sepsis, staphylococci (including methicillin-resistant staphylococci) need to be covered. • If allergic to vancomycin, replace with daptomycin 6mg/kg q24h iv. • If there are concerns about nephrotoxicity/ acute kidney injury, use ciprofloxacin in place of gentamicin.
3. NVE, severe sepsis AND risk factors for multiresistant Enterobacteriaceae, *Pseudomonas*		
Vancomycin[a] AND Meropenem	Dosed according to local guidelines, iv 2 g q8h iv	• Will provide cover against staphylococci (including methicillin-resistant staphylococci), streptococci, enterococci, HACEK, Enterobacteriaceae and *P. aeruginosa.*
4. PVE pending blood cultures or with negative blood cultures		
Vancomycin[a] AND Gentamicin[a] AND Rifampicin[a]	1 g q12h iv 1 mg/kg q12h iv 300-600 mg q12h po/iv	• Use lower dose of rifampicin in severe renal impairment.
NVE, native valve endocarditis; PVE, prosthetic valve endocarditis; ABW, actual body weight; IBW, ideal body weight; iv, intravenous; po, orally; q4h, every 4 h; q8h, every 8 h; q12h, every 12 h; q24h every 24 h. [a]Doses require adjustment according to renal function.		

12.3 Summary of treatment recommendations for staphylococcal endocarditis

Antimicrobial	Dose/route	Duration (weeks)	Comment
NVE, methicillin-susceptible *Staphylococcus spp.*			
Flucloxacillin	2 g every 4-6 h iv	4	• Use q4h regimen if weight >85 kg.
NVE, methicillin-resistant, vancomycin-susceptible (MIC ≤2 mg/L) rifampicin-susceptible *Staphylococcus* or penicillin allergy			
Vancomycin AND Rifampicin	1 g iv q12h 300-600 mg q12h po	4 4	• Dose according to local guidelines. Modify dose according to renal function and maintain pre-dose level 15-20 mg/l. • Use lower dose or rifampicin if CrCl <30mL/min
NVE, methicillin-resistant, vancomycin-resistant (MIC>2mg/L), daptomycin-susceptible (MIC ≤1 mg/L) *Staphylococcus* spp. Or patient unable to tolerate vancomycin			
Daptomycin AND Rifampicin OR Gentamicin	6 mg/kg q24h iv 300-600 mg q12h po 1 mg/kg iv, q12h	4 4 4	• Monitor creatine phosphokinase weekly. Adjust dose according to renal function. • Use lower dose of rifampicin if CrCl <30 mL/min
PVE, methicillin, rifampicin-susceptible *Staphylococcus* spp.			
Flucloxacillin AND Rifampicin AND Gentamicin	2 g every 4-6 h iv 300-600 mg q12h po 1mg/kg iv, q12h	6 6 6	• Use q4h regiment if weight >85 kg. • Use lower dose of rifampicin if CrCl <30 mL/min.
PVE. Methicillin-resistant, vancomycin-susceptible (MIC ≤2 mg/L), *Staphylococcus* spp. Or penicillin allergy			
Vancomycin AND Rifampicin AND Gentamicin	1 g iv q12h 300-600 mg q12h po 1 mg/kg q12h iv	6 6 ≥2	• Dose according to local guideline. Modify dose according to renal function and maintain pre-dose level 15-20 mg/L. • Use lower dose of rifampicin if CrCl <30 mL/min. • Continue gentamicin for the full course if there are no signs or symptoms or toxicity
PVE, methicillin-resistant, vancomycin-resistant (MIC >2 mg/L) daptomycin-susceptible (MIC ≤1 mg/L) *Staphylococcus* spp. Or patient unable to tolerate vancomycin			
Daptomycin AND Rifampicin AND Gentamicin	6 mg/kg q24h iv 300-600 mg q12h po 1mg/kg q12h iv	6 6 ≥2	• Increase daptomycin dosing interval to 48 hourly if CrCl <30 mL/min. • Use lower dose of rifampicin if CrCl <30 mL/min. • Continue gentamicin for the full course if there are no signs or symptoms of toxicity
NVE, native valve endocarditis; PVE, prosthetic valve endocarditis; iv, intravenously; po, orally; q12h, every 12 h;q24h, every 24 h.			

12.4 Summary of treatment recommendations for streptococcal endocarditis

Regimen	Antimicrobial	Dose & route	Duration (weeks)	Comment
Treatment options for streptococci (penicillin MIC ≤0.125 mg/L)				
1.	Benzylpencillin[a] monotherapy	1.2 g q4h iv	4-6	• Preferred narrow-spectrum regimen, particularly for patients at risk of *C. difficile* or high risk of nephrotoxicity
2.	Ceftriaxone Monotherapy	2 g once a day iv/im	4-6	• Not advised for patients at risk of *C. difficile* infection; suitable for OPAT
3.	Benzylpencillin[a] AND Gentamicin	1.2 g q4h iv 1 mg/kg q12h iv	2 2	• Not advised for patients with PVE, extra-cardiac foci of infection, any indications for surgery, high risk of nephrotoxicity or at risk of *C. Difficile*
4.	Ceftriaxone AND Gentamicin	2 g once a day iv/im 1 mg/kg q12h iv	2 2	• Not advised for patients with PVE, extra-cardiac foci of infection, any indications for surgery, high risk of nephrotoxicity or at risk of *C. difficile*
Treatment of streptococci (penicillin MIC >0.125 to ≤0.5 mg/L)				
5.	Benzylpenicillin AND Gentamicin	2.4 g q4h iv 1 mg/kg q12h iv	4-6 2	• Preferred regimen, particularly for patients at risk of *C. difficile*
Treatment of *Abiotrophia* and *Granulicatella* spp. (nutritionally variant streptococci)				
6.	Benzylpencillin[a] AND Gentamicin	2.4 g q4h iv 1 mg/kg q12h iv	4-6 4-6	• Preferred regiment, particularly for patients at risk of *C. difficile*
Treatment of streptococci penicillin MIC >0.5 mg/L see guidelines for the treatment of enterococci				
Treatment of streptococci in patient with significant penicillin allergy				
7.	Vancomycin AND Gentamicin	1 g q12h 1 mg/kg q12h iv	4-6 ≥2	• Dosed according to local guidelines
8.	Teicoplanin[b] AND Gentamicin	10mg/kg q12h iv for 3 DOSES, then q24h 1 mg/kg iv q12h	4-6 ≥2	• Preferred option when high risk of nephrotoxicity

OPAT, outpatient parenteral antimicrobial therapy; PVE, prosthetic valve endocarditis; im, intramuscularly; iv, intravenously; q4h, every 4 h; q12h, every 12 h; q24h. every 24 h. All drug dosages to be adjusted in renal impairment; gentamicin, vancomycin and teicoplanin level to be monitored.
[a]Amoxicillin 2 g every 4-6 h may be used in place of benzylpencillin 1.2/2.4 g every 4 h.
[b]Amend dose according to renal function. Teicoplanin serum trough levels must be measured to ensure levels of ≥20mg/L (and<60mg/L) and repeated at least weekly.

12.5 Summary of treatment recommendations for enterococcal endocarditis

Regimen	Antimicrobial	Dose & route	Duration (weeks)	Comment
1.	Amoxicillin OR Penicillin AND Gentamicin[a]	2 g q4h iv 2.4 g q4h iv 1 mg/kg q12h iv	4-6 4-6 4-6	• For amoxicillin-susceptible (MIC ≤4 mg/L), penicillin MIC ≤4 mg/L AND gentamicin-susceptible (MIC ≤128 mg/L) isolates. • Duration 6 weeks PVE
2.	Vancomycin[a] AND Gentamicin[a]	1 g q12h iv or dosed according to local guidelines 1 mg/kg q12h iv	4-6 4-6	• For penicillin-allergic patient or amoxicillin- or penicillin-resistant isolate; ensure vancomycin MIC ≤4 mg/L • Duration 6 weeks for PVE
3.	Teicoplanin[a] AND Gentamicin[a]	10mg/kg q12h iv for 3 DOSES, then q24h 1 mg/kg q12h iv	4-6 4-6	• Alternative to Regimen 2, see comments for Regimen 2; ensure teicoplanin MIC ≤2 mg/L
4.	Amoxicillin[a,b]	2 g q4h iv	≥6	• For amoxicillin-susceptible (MIC≤4 mg/L) AND high-level gentamicin resistant (MIC >128 mg/L) isolates

PVE, prosthetic valve endocarditis; IBW, ideal body weight; iv, intravenously; q4h, every 4 h; q12h, every 12 h; q24h, every 24 h.
[a]Amend dose according to renal function. Teicoplanin serum trough levels must be measured to ensure levels of ≥20mg/L (and<60mg/L) and repeated at least weekly.
[b]Streptomycin 7.5 mg/kg every 12 h intramuscularly can be added if isolate is susceptible.

12.6 Summary of treatment recommendations for Q fever

Regimen	Antimicrobial	Dose	Duration
1.	Doxycycline[a] and Hydroxychloroquine[b]	100 mg q12h po 200 mg q8h po	Both antibiotics for ≥18 months and <4 years
2.	Doxycycline[a] and Ciprofloxacin	100 mg po 200 mg q12h po	≥3 years
q8h, every 8 h; q12h, every 12 h; po, orally. [a]In slow responders, defined as <50% reduction in mean phase 1 titres, doxycycline dosing should be adjusted to achieve serum levels of ≤5 mg/L. [b]Plasma levels to be maintained at 0.8-1.2 mg/L. Monthly serum levels must be obtained and dose adjusted accordingly. Photosensitivity is common. Retinal accumulation necessitates regular examination.			

- Ciprofloxacin has been successfully used to treat HACEK IE and can be administered orally; it has therefore been included as an alternative agent for therapy.

12.7 Summary of treatment recommendations for Bartonella IE

Agent	Dose/route	Duration (weeks)	Comment
Amoxicillin AND Gentamicin	2 g q4h iv 1 mg/kg q8h iv	6 4	• If penicillin allergic use tetracycline (second regime) • Regular serum levels are needed to guide maintenance dose
Doxycycline AND Gentamicin	200mg q24h po 1 mg/kg q8h iv	≥4 weeks	
po, orally; iv, intravenously; q4h, every 4 h; q8h, every 8 h; q24h, every 24 h.			

- IE is a feature of chronic *Bartonella* infection. Only aminoglycosides have bactericidal activity against *Bartonella* spp., although susceptibility to macrolides, rifampicin and tetracycline has been demonstrated.

12.8 Summary of treatment recommendations for fungal endocarditis

Antifungal agent	Dose/route	Serum levels required	Role in treating *Candida* endocarditis	Role in treating *Aspergillus* endocarditis
Fluconazole	400 mg daily, only reduced in severe renal failure/dialysis	No	Long-term suppressive therapy	None
Voriconazole	Intravenous therapy preferred initially, licensed doses	Yes, with dose modification	Long-term suppressive therapy for fluconazole-resistant, voriconazole-susceptible isolates	First-line therapy with long-term suppression
Amphotericin B	3 mg/kg/24 h (AmBisome) 5 mg/kg/day (Abelcet) 1mg/kg/day (Fungizone)	No	Second-line therapy	Second-line therapy, or first line if azole resistance; should not be used for *A. terreus* or *A. nidulans* infection
Micafungin	200 mg daily	No	First-line therapy	Third- or fourth-line therapy
Caspofungin	70 mg loading, 50-100 mg daily	No	First-line therapy	No role
Anidulafungin	Licensed doses	No	First-line therapy	No role
Posaconazole	400 mg twice daily	Yes	No role	Third- fourth-line therapy, long-term suppressive therapy
Flucytosine	100 mg/kg/day in three doses, reduced with renal dysfunction	Yes, with dose modification important	As combination therapy with Amphotericin B	As combination therapy with Amphotericin B
Itraconazole	NA	NA	No role	No role
NA, not applicable.				

12.9 Gentamicin monitoring in endocarditis

12.9.1 Gentamicin should be dosed according to actual body weight (ABW) unless patients are obese, in which case dosing should be based on corrected body weight (CBW). See appendix 3, under heading 'Gentamicin dosing in obesity.'

12.9.2 Levels should be taken regularly to ensure that pre-dose (trough) levels remain <1mg/L.

12.9.3 Clotted blood should be taken 12 hours after the last dose (immediately pre-dose) for twice daily dosing. This cannot be left to the phlebotomist because timing is crucial. It is essential that the time of the dose and the time of the level be documented on the blood sciences request form as it is impossible to interpret without this information.

12.9.4 Where a patient has normal renal function that is stable, twice weekly monitoring is sufficient.

12.9.5 In patients with renal impairment, dosage should be adjusted according to measured or estimated creatinine clearance and drug monitoring results. Levels in these patients should be monitored on a daily basis.

12.10 Prophylaxis and endocarditis

12.10.1 NICE have recently reviewed the evidence for antibiotic prophylaxis against infective endocarditis (IE) in dental and other surgery and have concluded that the routine use of antibiotics in most, if not all, situations is not justified on the balance of risks and benefits.

12.10.2 The maintenance of optimal oral health and hygiene may reduce the incidence of bacteraemia from daily activities and may be more important than prophylactic antibiotics for a dental procedure to reduce the risk of IE as IE is much more likely to result from frequent exposure to random bacteraemias associated with daily activities than from bacteraemia caused by a dental, GI tract, or GU tract procedure.

12.10.3 People with the following cardiac conditions should be regarded as at risk of developing IE:

- Acquired valvular heart disease with stenosis or regurgitation
- Valve replacement
- Structural congenital heart disease
- Hypertrophic cardiomyopathy
- Previous IE

12.10.4 Do not offer prophylaxis against IE:

- To people undergoing dental procedures to people undergoing non-dental procedures at the following sites:
- Upper and lower gastrointestinal tract
- Genitourinary tract; this includes urological, gynaecological and obstetric procedures and childbirth
- Upper and lower respiratory tract; this includes ear, nose and throat procedures and bronchoscopy

12.10.5 Do not offer chlorhexidine mouthwash as prophylaxis against IE to people at risk undergoing dental procedures.

12.10.6 Investigate and treat promptly any episodes of infection in people at risk of IE to reduce the risk of endocarditis developing.

12.10.7 Offer an antibiotic that covers organisms that cause IE if a person at risk of IE is receiving antimicrobial therapy because they are undergoing a gastrointestinal or genitourinary procedure at a site where there is a suspected infection.

13. Meningitis

13.1 Adult Community-Acquired Infection Management

13.1.1 Patients with meningitis classically present with signs of meningism; headache, neck stiffness and photophobia. A rash may be absent or atypical at presentation, neck stiffness may be absent in up to 30% of cases and prior antibiotics may mask the severity of illness.

13.1.2 Patients with encephalitis or brain abscess may present with altered mental state, seizures and focal neurological signs. Signs of meningism are less common.

13.1.3 In suspected encephalitis or brain abscess a CT scan of head should be performed to exclude a space-occupying lesion. This should not delay the first administration of antibiotics.

13.1.4 In A&E, blood cultures should always be taken before antibiotics are administered.

13.1.5 An EDTA specimen (purple top bottle) should be taken and sent for PCR studies.

13.1.6 For action to be taken for suspected bacterial meningitis on admission to hospital, refer to Infection Prevention and Control Policy.

13.1.7 Depending upon whether the CSF sample is lymphocytic or neutrophilic, the following aetiologies should be considered:

Neutrophilic meningitis

- Bacterial meningitis caused by *S.pneumoniae, N.meningitidis* and *H.influenzae*
- Brain abscess

Lymphocytic meningitis

- Viral meningitis, most commonly caused by enteroviruses
- Viral encephalitis caused by *Herpes simplex* virus
- Bacterial especially partially treated bacterial meningitis
- Listeria meningitis
- Tuberculous meningitis (particularly if the patient is of Southern Asian or African origin, CSF protein is elevated and CSF glucose low).
- HIV seroconversion
- Cryptococcal meningitis
- Syphilitic meningitis
- West Nile fever. May also occur in non-infectious diseases including neoplasia. Always isolate the patient for the first 24 hours.

13.2 Empiric Treatment of Meningitis

Infection	Likely pathogen	1st line	Alternative	Duration	Notes
Suspected bacterial meningitis	*Meningococcus* *Pneumococcus* *Haemophilus*	Ceftriaxone IV 2g 12-hourly If multiresistant pneumococci suspected: **ADD** **Vancomycin IV continuous infusion *If >65 years, immune-compromised, pregnant, or for Listeria cover, consider adding:* Amoxicillin IV 2g 4-hourly Change to Benzylpenicillin IV 2.4g 4-6 hourly if a sensitive organism is identified	Severe type-1 penicillin allergy: Chloramphenicol IV 25mg/kg (max 1g) 6-hourly, reducing to 12.5mg/kg 6-hourly as soon as clinically indicated **PLUS** **Vancomycin IV continuous infusion	7 days 14 days 10 days	
Suspected Herpes Encephalitis *Does not usually present as meningitis, but as encephalitis with an alteration in consciousness/ behaviour*	*Herpes Simplex*	Aciclovir IV 10mg/kg 8-hourly (normal renal function) *If patient's weight is >120% of Ideal Body Weight, dose as per IBW.*		21 days	For dose adjustments in renal impairment refer to the BNF or contact a pharmacy. **Aciclovir** must be given if there is a clinical suspicion of *Herpes simplex* viral encephalitis. It is not required in suspected viral meningitis (e.g. Enterovirus)

***for vancomycin dosing see Appendix 5.*

Review treatment once microbiology results are available

13.3 Treatment of Microbiologically Confirmed Meningitis

Infection	Pathogen	1st line	Alternative	Duration	Notes
Confirmed meningitis	*Neisseria meningitidis*	Ceftriaxone IV 2g 12-hourly	Chloramphenicol IV 25mg/kg (max 1g) 6-hourly, reducing to 12.5mg/kg 6-hourly as soon as clinically indicated	7 days	If not initially treated with ceftriaxone, patients should receive chemoprophylaxis (see section 6.3)
	Streptococcus pneumoniae	Ceftriaxone IV 2g 12-hourly **OR** Benzylpenicillin IV 2.4g 4-hourly	Chloramphenicol IV 25mg/kg (max 1g) 6-hourly, reducing to 12.5mg/kg 6-hourly as soon as clinically indicated	14 days	If highly resistant S. pneumonia isolated, **add** **vancomycin IV continuous infusion for first dose +/- rifampicin IV 600mg 12-hourly.
	Haemophilus influenza	Ceftriaxone IV 2g 12 hourly	Ceftriaxone IV 2g 12 hourly **OR** Chloramphenicol IV 25mg/kg (max 1g) 6-hourly, reducing to 12.5mg/kg 6-hourly as soon as clinically indicated	14 days	
	Listeria monocytogenes	Amoxicillin IV 2g 4-hourly **PLUS** *Gentamicin IV once daily dosing	Co-trimoxazole IV 120mg/kg daily in 2-4 divided doses	21 days	
TB meningitis	*Mycobacterium tuberculosis*	Follow TB treatment protocol **See section on tuberculosis**		12 months	
Syphilitic meningitis		Refer all cases to the GUM physician			

**for gentamicin dosing see Appendix 3*
***for vancomycin dosing see Appendix 5*

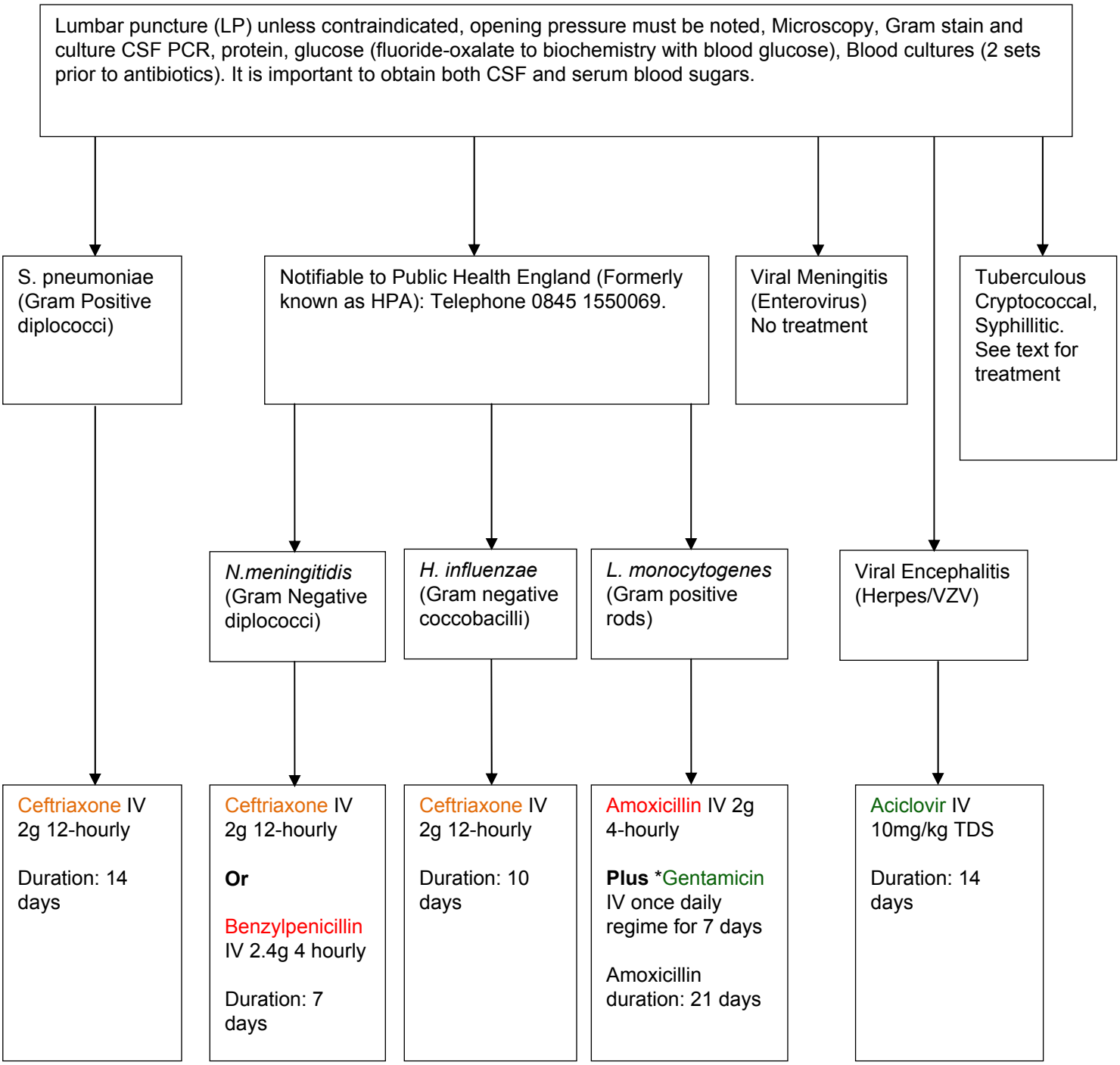
13.4 Prevention of Secondary Cases of Bacterial Meningitis (*Haemophillus* and *Meningococcal* meningitis only)

13.4.1 Important Information for Health Professionals and Parents:

- Antibiotic prophylaxis should be given as soon as possible (ideally within 24 hours) after the diagnosis of the index case. (HPA)
- Ciprofloxacin is now recommended for chemoprophylaxis in all age groups and in pregnancy (HPA).
- The above are rounded doses, to make administration easier. These doses may differ slightly to those calculated from body weight using the manufacturer's directions (enclosed) however the differences, if any, are not clinically important.
- For children who are significantly under/overweight for their age, it may be appropriate to use a different dosing band to that stated for their age in the above table. For further advice please contact your Pharmacist or Medicines Information (ext 4822).
- Ciprofloxacin is an alternative for all ages from 1 month old upwards.
- Chemoprophylaxis for *N.meningitidis* and *H. Influenzae* infection must also be given to the index case as soon as the patient is able to take oral medication and at least two days prior to hospital discharge **unless treated with Ceftriaxone.** Patients treated with cefotaxime should still receive prophylaxis as it is not known whether it eradicates nasopharyngeal carriage. (HPA)

	1st Line	Alternative	Notes
Adults and children over 12 years	Ciprofloxacin PO 500mg **single dose**	Rifampicin PO 600mg BD for **2 days only**	
Children (5-12 years)	Ciprofloxacin** PO 250mg **single dose**	Rifampicin PO for 2 days (see dosage information*)	**Rifampicin* is available as a 100mg/5ml syrup. Dose as follows:* **Age 0 – 2 months:** 20mg (1ml) BD for 2 days **Age 3-11 months:** 40mg (2ml) BD for 2 days **Age 1-2 years:** 100mg (5ml) BD for 2 days **Age 3-4 years:** 150mg (7.5ml) BD for 2 days **Age 5-6 years:** 200mg (10ml) BD for 2 days **Age 7-12 years**: 300mg (15ml) BD for 2 days ***Ciprofloxacin is available as a 250mg/5ml suspension*
Children (under 5 years)	Ciprofloxacin** PO 30mg/kg (up to 125mg) **single dose**		
Pregnant women	Ciprofloxacin PO 500mg **single dose**	Ceftriaxone IM 250mg **single dose** only Alternative: Azithromycin PO 500mg **single dose**	**Note:** Ciprofloxacin and rifampicin are compatible with breastfeeding

13.5 Management of Meningitis – summary



13.6 Cerebral Abscess and Subdural Empyema

13.6.1 Treatment depends on pathogenesis of abscess. Send pus/biopsy for microscopy, culture and sensitivity testing, Plus PCR testing as appropriate.

Infective Source	Intracerebral Location	Adult Antibiotic Regimen	Alternative Adult Antibiotic Regime
Paranasal sinuses	Frontal lobe	Ceftriaxone IV 2g 12-hourly **and** Metronidazole IV 500mg 8-hourly	Continuous infusion **Vancomycin keeping levels 15-25mg/l (see Appendix 5). **Plus** Ciprofloxacin 400 mg 8-12 hourly **Plus** Metronidazole iv 500 mg 8 hourly
	Seek neurological advice		
Teeth	Frontal lobe	Ceftriaxone IV 2g 12 hourly **and** Metronidazole IV 500mg 8 hourly	Continuous infusion **Vancomycin keeping levels 15-25mg/l (see Appendix 5). **Plus** Ciprofloxacin 400 mg 8-12 hourly **Plus** Metronidazole iv 500 mg 8-hourly
Middle ear (less often sphenoidal sinuses)	Temporal lobe	Ceftriaxone IV 2g 12-hourly **and** Metronidazole IV 500mg 8-hourly	Continuous infusion** Vancomycin keeping levels 15-25mg/l (see Appendix 5). **Plus** Ciprofloxacin 400 mg 8-12 hourly **Plus** Metronidazole iv 500 mg 8-hourly
Middle ear (less often sphenoidal sinuses)	Cerebellum	Amoxicillin IV 2-3g 8-hourly **and** Metronidazole IV 500mg 8-hourly **plus** Ceftazidime IV 2g 8-hourly **or** *Gentamicin once daily dosing	
Penetrating trauma	Depends on site of wound	Flucloxacillin IV 4-6hourly **+/-** *Gentamicin once daily dosing **or** Ceftriaxone IV 2g 12-hourly	Continuous infusion **Vancomycin keeping levels 15-25mg/l (see Appendix 5). **Plus** Ciprofloxacin 400 mg 8-12 hourly **Plus** Metronidazole iv 500 mg 8-hourly

** for gentamicin dosing see Appendix 3*
***for vancomycin dosing see Appendix 5*

Infective Source	Intracerebral Location	Adult Antibiotic Regimen	Alternative Adult Antibiotic Regime
Metastatic and cryptogenic	Multiple lesions, usually in area supplied by the middle cerebral artery.	Depends on source: Benzylpenicillin IV 1.8g-2.4g 6 hourly (endocarditis/ cyanotic congenital heart disease). Ceftriaxone IV 2g 12 hourly **+/-** Metronidazole IV 500mg 8 hourly **Duration:** Minimum of 4-6 weeks if the abscess has been aspirated or drained, or 6–8 weeks if the patient has been treated conservatively.	
Second line treatment for all above		Chloramphenicol 25mg/kg (max 1g) 6-hourly **+/-** **Vancomycin continuous infusion **plus** Metronidazole IV 500mg 8 hourly. Duration as above.	
NB: Intraventricular rupture is a particularly serious complication of intracranial abscess and is associated with a mortality rate exceeding 80%. Always seek consultant Neurosurgeon advice.			

*** for vancomycin dosing see Appendix 5*

13.7 Hospital Acquired Infection

DIAGNOSIS	TREATMENT	COMMENTS
Post-neurosurgical meningitis	**First choice:** Ceftriaxone IV 2g 12-hourly **Alternatives:** If patient has received a broad-spectrum antibiotic or has confirmed *P.aeruginosa* use Meropenem IV 2g 8-hourly If patient has suspected/confirmed meningitis caused by ESBL producing coliform use Meropenem IV 2g 8-hourly If patient has meningitis caused by MSSA use Flucloxacillin IV 2g 6-hourly + Rifampicin 300-600 mg 12-hourly orally If patient has meningitis caused by MRSA use **Vancomycin by continuous infusion **plus** Rifampicin IV 300-600mg 12-hourly	Review treatment once results of culture and sensitivity testing become available

*** for vancomycin dosing see Appendix 5*

13.8 Coliform or Gram-negative meningitis

13.8.1 Treatment: According to results of culture and sensitivity tests.
Duration: minimum 3 weeks

14. Skin and Soft Tissue Infections (SSTI)

14.1 Empiric Treatment of SSTIs

Infection	Likely Pathogen	Antimicrobials	Alternative
Cellulitis	Group A, C, G Beta haemolytic *Streptococcus* *Staph.aureus*	**Not severe:** Flucloxacillin 500mg 6 hourly orally **Moderate-Severe:** Benzylpenicillin IV 1.2- 1.8 g 6 hourly **plus** Flucloxacillin IV 1g 6 hourly Change to oral: Co-amoxiclav 625 mg 8 hourly High dose IV antimicrobials are necessary initially for moderate and severe cellulitis. Consider oral only after satisfactory response. Ceftriaxone IV/IM 1g - 2g daily can be used if patient is discharged from hospital to community for continuation of treatment.	**If Penicillin allergy:** Clindamycin IV / oral 450mg 6 hourly **Or** Doxycycline 200mg stat then 100mg daily orally **plus** Rifampicin 300mg 12 hourly orally
Necrotising Fasciitis **See notes in Appendix 2**	*Group A. Streptococci*	Clindamycin IV 600mg-1200mg 6-hourly Plus Meropenem IV 1-2g 8-hourly	Provides adequate cover for synergistic and exotoxin producing Gram-positive NF. **See notes in Appendix 2**
Impetigo: SEVERE **Nb. In all cases of impetigo use staph decontamination regime**	*Staphylococcus aureus*	Flucloxacillin oral 500mg 6 hourly **Or** Flucloxacillin IV 1-2g 6 hourly **plus** Oral Rifampicin 300-600 mg bd	**If penicillin allergy** Clindamycin oral 300mg 6 hourly **Or** Clindamycin IV 600mg 6 hourly **plus** Oral Rifampicin 300 mg bd **High risk of MRSA** Vancomycin infusion keeping levels 10-25 mg/ml plus Oral Rifampicin 300-600 mg bd
Folliculitis/ Boils **Nb. All cases use *staphylococcal* decontamination regime**	*Staphylococcus aureus*	Flucloxacillin oral 500mg 6 hourly **OR** Flucloxacillin IV 1-2g 6 hourly **plus** Oral Rifampicin 300-600 mg bd	**If penicillin allergy** Clindamycin oral 300-450mg 6 hourly **plus** oral Rifampicin 300-600 mg bd **OR** Doxycycline 100 mgd bd Plus Rifampicin 300 mg bd **High risk of MRSA:** Vancomycin infusion keeping levels 10-25 mg/ml **plus o**ral Rifampicin 300-600 mg bd

Infection	Likely Pathogen	Antimicrobials	Alternative
Erysipelas	Group A, C, G Streptococci	Benzylpenicillin IV 1.8g 6 hourly For the less severe cases oral Amoxicillin is adequate.	Consider oral therapy following adequate clinical response. **If Penicillin allergy:** Clindamycin oral 450 mg 6 hourly
Leg Ulcers	Wide range of organisms	Try and avoid antibiotics for leg ulcers. All skin breaks will become contaminated. Good local skin care is required	Skin ulcers will usually be colonised by many organisms. Significance is established by clinical signs of infection + type of organism.
Animal Bites	*Staphylococcus aureus* *Streptococcus pyogenes* Anaerobes *Pasteurella multocida*	If antibiotics clinically indicated: Co-amoxiclav oral 625mg 8 hourly pending microbiological results	**If penicillin allergy:** Doxycycline 200mg stat and then 100 mg bd **Plus** Ciprofloxacin 500 mg bd **Plus** Metronidazole 500mg tds **Nb.** Do not use clindamycin and macrolides for animal bites as *Pastuerella Multocide* intrinsically resistant and is a common cause of infection.
Human Bites	*Staphylococcus aureus* *Streptococcus pyogenes* Anaerobes	Co-amoxiclav oral 625mg 8-hourly	Doxycycline 200mg stat and then 100 mg bd **Plus** Ciprofloxacin 500 mg bd **Plus** Metronidazole 500mg tds
Pemphigus neonatorum **Toxic epidermal necrolysis**	*Staphylococcus aureus*	Flucloxacillin oral 500mg 6 hourly **plus** Sodium fusidate oral 500mg 8 hourly	**If penicillin allergy** Erythromycin oral 500mg 6 hourly **plus** *Staph* decontamination regimen
Hidradenitis suppurativa	Anaerobes, occasionally microaerophilic organisms	Metronidazole oral 400mg 8 hourly **or** Co-amoxiclav oral 625mg 8 hourly	

14.2 Dermatophyte Infections

INFECTION	ORGANISMS	ANTIMICROBIALS	COMMENTS
Skin Infections	*Trichophyton sp.* *Epidermophyton sp.* *Microsporum sp.*	For limited infections topical therapy with Clotrimazole 1% cream applied 2 to 3 times a day **or** Terbinafine cream 1% bd **or** Miconazole 2% cream applied twice daily	Skin scrapings should be sent to Microbiology.
Scalp Ringworm and Extensive Tinea infections	*As above*	Terbinafine oral 250mg once daily for at least 4 weeks **or** Itraconazole (pulsed) oral 200mg daily for 7 days – repeat after 21 days for 3 courses	
Pityriasis versicolor	*Malassezia furfur*	Topical Selenium Sulphide (3 day course) Repeated after one month.	Selsun shampoo can be used. In recurrent cases Itraconazole should be considered.
Nail Infections	*Trichophyton sp.* *Epidermophyton sp.*	Terbinafine oral 250mg od 6 weeks - 3 months	Nail clippings should be sent to Microbiology.

14.3 Candida Skin Infections

INFECTION	ORGANISMS	ANTIMICROBIALS	COMMENTS
Candidiasis	*Candida albicans* *Candida glabrata* *Candida tropicalis etc*	Fluconazole oral 50mg daily for 2-4 weeks Clotrimazole 1% cream bd **or** Miconazole 2% cream bd **Or** terbinafine 1% cream bd	Exclude Tinea pedis, corporis, Pityriasis versicolor Duration or therapy will depend on the clinical condition

14.4 Viral Skin Infections

INFECTION	ORGANISMS	ANTIMICROBIALS	COMMENTS
Herpes Simplex	*Herpes simplex*	Aciclovir cream 5%. Apply to lesions 5 times/day for 5 days at first sign of attack	
Chicken Pox	*Varicella-Zoster virus*	Aciclovir oral 800mg 5 times / day for 7 days	
Herpes Zoster	*Varicella-Zoster virus*	Aciclovir oral 800mg 5 times / day for 7 days	

14.5 Arthropod Infestations

INFECTION	ORGANISMS	ANTIMICROBIALS	COMMENTS
Scabies	*Sarcoptes scabiei*	Permethrin 5% cream. Apply over the whole body and wash off after 8 - 12 hours. (30-60g suitable amount for a single application in an adult) 2nd line Malathion 0.5% aqueous liquid (Derbac-M)	All members of the affected household should be treated, paying particular attention to the web of the fingers and toes and brushing under the ends of nails. In severe scabies (excluding babies) Permethrin may be applied on two successive nights.
Head Lice	*Pediculus capitis*	Malathion 0.5% aqueous liquid (Derbac-M) Or Dimeticone 4% lotion - Rub into dry hair and scalp, allow to dry naturally. Shampoo after min 8hrs (or overnight). Repeat after 7 days	Two applications of the preparation 7 days apart to prevent lice emerging from eggs that survive the first application.

15. Wound Infections

INFECTION	ORGANISMS	ANTIMICROBIALS	COMMENTS
Following Clean Surgery	*Staph. aureus*	Flucloxacillin IV 1-2g 6 hourly **or** oral 1g 6-hourly	**If penicillin allergy:** Clindamycin 450-600mg IV 6 hourly **plus** Staphylococcal decontamination regime
	Group. A Streptococci	Benzylpenicillin IV 1.8-2.4g 6-hourly	
	MRSA	Doxycycline oral 100mg12 hourly **plus** Rifampicin oral 300mg 12 hourly	**plus** *Staph* decontamination regimen
Following Contaminated Surgery	*Staph. aureus* *Coliforms* *Anaerobes* *MRSA*	Depending on microbiology results Piperacillin/tazobactam 4.5g 8-hourly **plus** Metronidazole IV 400mg 8-hourly	Appropriate surgical intervention and drainage may be necessary
Necrotising Fasciitis, Gas Gangrene and other Severe Anaerobic infections.	Mixed organisms	Depending on microbiology results, consider Piperacillin/tazobactam IV 4.5g 6-8hourly **plus** Metronidazole IV 400mg 8-hourly **or** Meropenem IV 1-2g 8-hourly **plus** **Vancomycin continuous infusion	**See Appendix 2**
Uncomplicated MRSA infection NOT requiring IV Therapy	*MRSA*	Doxycycline oral 100mg bd **plus** Rifampicin oral 300mg 12 hourly	Usually 5-7 day course is sufficient **plus** Local decontamination policy for MRSA (see Appendix 9)

*** for vancomycin dosing see Appendix 5*

16. ENT Infections

INFECTION	ORGANISMS	ANTIMICROBIALS	ALTERNATIVE / COMMENTS
Tonsillitis / Pharyngitis	*Group A Streptococci* *Group C Streptococci* *Group G Streptococci*	**If Severe:** Benzylpenicillin IV 1.8g 6 hourly for 48 hours followed by: Penicillin V oral 500mg 6 hourly Duration of therapy 10 days.	
Peritonsillar Abscess / Quinsy	*As above* *+ / -* *Anaerobes*	As above **plus** Metronidazole oral 400mg 8 hourly Duration of therapy 10 days.	
Otitis Externa	*Staph. aureus* Group A, C or G *Streptococci* Anaerobes	According to culture and sensitivity	May not be infective. Usually topical treatment suffices. Preferable to use topical agents that cannot be useful systematically. Systemic antimicrobials in serious infections
Malignant Otitis Externa	*Pseudomonas*	Ciprofloxacin 750 mg 12 hourly orally or 400 mg 12 hourly IV	Ceftazidime 1g 8-hourly IV 1-2g 8-hourly
Acute Otitis Media (1st episode)	Viral *Strep. pneumoniae* *Haemophilus influenzae*	**Do not use antibiotics** Amoxicillin oral 250-500mg 8 hourly for 5-7 days.	 Ciprofloxacin 400 mg 8-12 hourly IV **Or** 750 mg 12 hourly orally
Chronic or Discharging Otitis Media	*Strep. pneumoniae* *Haemophilus influenzae* Wide range of organisms including Coliforms, *Pseudomonas*, *and Staph. aureus*	Treat according to culture results.	Swab should be taken for culture.
Acute Sinusitis	Viral *Strep. pneumoniae* *Haemophilus influenzae* + Wide range of organisms including: *Strep. pneumoniae* and Anaerobes	Co-amoxiclav IV 1.2g 8 hourly for 14 days **or** Co-amoxiclav oral 625g mg 8 hourly for 14 days	**If penicillin allergy:** Azithromycin oral 500mg daily for 3 days
Epiglottitis (supraglottitis)	*Haemophilus influenza* *β haemolytic streptococci*	Ceftriaxone IV 2g 12 hourly	
Oral Thrush	*Candida albicans*	Nystatin TOP/PO 1ml qds for 7-14 days	**Alternative:** Miconazole oral gel 2% QDS for 7-14 days (Check BNF for interactions)
Oesophageal candida	*Candida albicans*	Fluconazole PO 50mg od for 14 days	

17. Oral and Maxillofacial Surgery Infections

INFECTION	ORGANISMS	ANTIMICROBIALS	COMMENTS
Acute infections including tissue space abscesses secondary to dental sepsis etc.	Oral and upper respiratory flora	Co-amoxiclav IV 1.2g 8 hourly **plus** Metronidazole oral 400mg 8 hourly	Duration dependent upon severity of infection **If penicillin allergy:** Clindamycin IV 300- 450mg 6 hourly then oral Clindamycin

18. Eye Infections

18.1 With the exception of bacterial conjunctivitis, all ocular infections should be treated in consultation with a Consultant Ophthalmologist and Consultant Microbiologist

INFECTION	ORGANISMS	ANTIMICROBIALS	COMMENTS
Conjunctivitis	*Staphylococcus aureus* *Streptococcus pneumoniae* *Haemophilus influenzae* *Moraxella catarrhalis*	Chloramphenicol 0.5% eye drops 2 hourly reduced to qds after 48 hours for 5 days or 1% ointment 3-4 times a day for 5 days	In conjunction with *staphylococcal aureus* decontamination regime as appropriate.
	MRSA	Fusidic acid eye drops 1% 12 hourly	In conjunction with MRSA decontamination policy Appendix 9

19. Bone and Joint Infections

INFECTION	ORGANISMS	ANTIMICROBIALS	COMMENTS
Acute Osteomyelitis Adults	Meticillin sensitive *staphylococcus aureus* Other Gram-Positive or Gram-Negative organisms	Flucloxacillin IV 2g 6 hourly **plus** Rifampicin oral 300-600 mg 12 hourly	Blood culture and other relevant orthopaedic samples should be taken before initiation of therapy. IV therapy for at least 1-2 weeks in the first instance, followed by oral therapy for a total of 6-8 weeks. **If penicillin allergy**: **Continuous infusion Vancomycin keeping levels 15-25 mg/l **plus** Rifampicin oral 300-600 mg 12-hourly
	Meticillin resistant *staphylococcal aureus*	Continuous infusion **Vancomycin keeping levels 15-25 mg/l **plus** Rifampicin oral 300-600 mg 12-hourly	
Chronic osteomyelitis	As above		Duration of treatment is normally longer
Septic arthritis **A) Native joint Adults**	*MSSA* MRSA	As for osteomyelitis	As above; IV therapy for at least 2 weeks followed by oral therapy Total of 6 weeks
B) Prosthetic joint	*Coagulase negative Staphylococci.* *Staph. aureus* *Coliforms.* *Wide range of organisms*	Collaborative management between Orthopaedic Surgeon and Microbiologist. Appropriate sampling and identification of infecting agent is crucial.	

*** for vancomycin dosing see Appendix 5*

20. Obstetric and Gynaecological Infections

INFECTIONS	ORGANISMS	ANTIMICROBIALS	COMMENTS
Post-operative **and** **Post-partum Sepsis including chorioamnionitis**	*Coliforms* *Enterococcus* *Group. B Streptococci* *Anaerobes*	**If severe:** Piperacillin/tazobactam IV 4.5g 8 hourly **plus** Metronidazole IV 500 mg 8 hourly **Oral therapy** Co-amoxiclav oral 625mg 8 hourly	Specimens required by Microbiology: Blood culture, urine, HVS or endocervical swab. **If type 1 penicillin allergy:** Continuous infusion **Vancomycin keeping levels 15-25mg/l **plus** Ciprofloxacin IV 400 mg 12 hourly **plus** Metronidazole IV 500 mg tds
Pelvic inflammatory disease	*Chlamydia trachomatis* *Neisseria gonorrhoeae*	Ceftriaxone IV / IM 1g as a single dose if uncomplicated **or** Ceftriaxone IV / IM 2g daily for 7 – 10 days if complicated **plus** Doxycycline oral 100mg 12 hourly for 14 days **plus** Metronidazole oral 400mg 12 hourly 14 days **Doxycycline is contraindicated in pregnancy and lactation**	IV therapy should be continued for at least 24 hours after clinical improvement and then switched to oral. Alternative in Type-1-penicillin allergy Clindamycin IV 900mg 8-hourly **plus** *Gentamicin IV once daily dosing **plus** Metronidazole PO 400mg 12-hourly **14 day total duration** **for gentamicin dosing see Appendix 3*

*** for vancomycin dosing see Appendix 5*

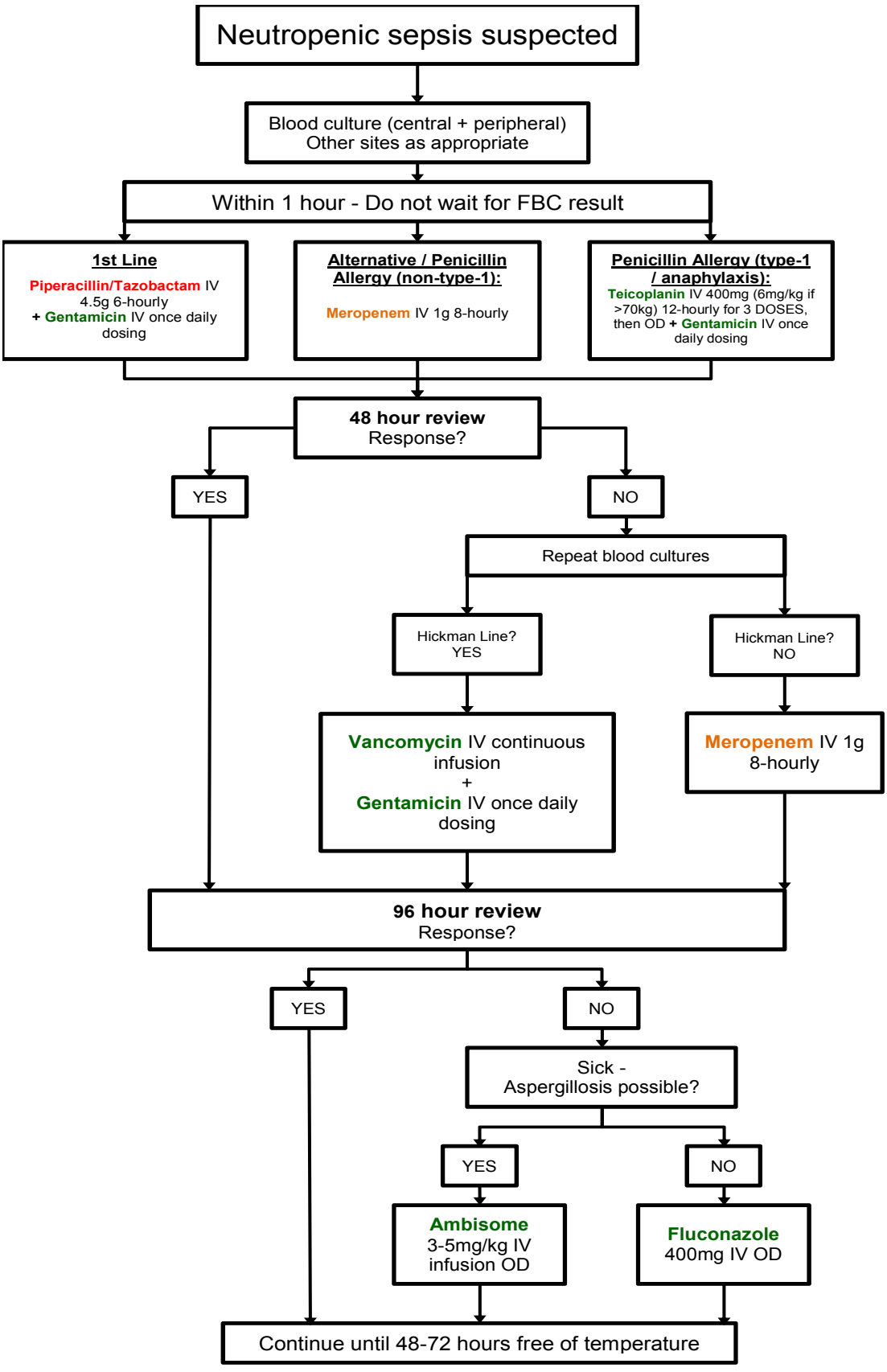
21. Sexually Transmitted Infections

INFECTIONS	ORGANISMS	ANTIMICROBIALS	COMMENTS
Syphilis	*Treponema pallidum*	TREATMENT FOR SYPHILIS SHOULD BE GIVEN UNDER EXPERT SUPERVISION – CONSULTANT FOR GU MEDICINE	Syphilis should be excluded in all cases of genital ulceration
Gonorrhoea	*Neisseria gonorrhoea*	Ceftriaxone IM 250mg as a single dose **or** Cefotaxime 400mg orally as a single dose if IM route contraindicated (unlicensed)	Where sensitivity known or resistance status known Ciprofloxacin 500mg oral as a single dose PREGNANCY: Ceftriaxone IM 250mg as a single dose
ALL REGIMENS ARE FOR UNCOMPLICATED GENITAL GONORRHOEA ONLY. COMPLICATIONS SUCH AS SALPINGITIS, ARTHRITIS, SEPTICAEMIA REQUIRE MORE PROLONGED TREATMENT UNDER EXPERT SUPERVISION			
Bacterial vaginosis	*Mixed anaerobes*	Metronidazole oral 400mg *12 hourly* **plus** Clindamycin cream nocte for 7 days	
Candidosis	*Candida species*	Clotrimazole pessary 500mg as a single dose **plus** Clotrimazole 1% cream bd **or** Fluconazole 150mg orally as a single dose **plus** Clotrimazole 1% cream bd	
Acute prostatitis		Ciprofloxacin oral 500-750mg 12 hourly for 28 days	

INFECTIONS	ORGANISMS	ANTIMICROBIALS	COMMENTS
Acute uncomplicated cystitis arising outside hospital	*Escherichia coli* *Staphylococcus saprophyticus* *Less commonly other organisms*	Trimethoprim oral 200mg 12 hourly **or** Amoxicillin oral 500mg 8 hourly **or** Nitrofurantoin oral 50mg 6 hourly	3 days treatment is usually adequate if uncomplicated. However, give 7 days in men and the elderly Also consider the need for specialist referral **Trimethoprim must NOT be co-prescribed with methotrexate –** increased risk of bone marrow suppression. Nitrofurantoin should not be used in renal impairment (eGFR<45ml/min) or pyelonephritis, and is contra-indicated in G6PD deficiency
Chlamydia trachomatis	*Chlamydia trachomatis*	Doxycycline oral 100mg 12 hourly for 7 days **or** Azithromycin oral 1g stat **or** Erythromycin oral 500mg 12 hourly for 2 weeks	**Tetracyclines are contraindicated in pregnancy and lactation**
Nonspecific urethritis		Doxycycline oral 100mg 12 hourly for 7 days **or** Azithromycin oral 1g stat **or** Erythromycin oral 500mg 12 hourly for 2 weeks	**Tetracyclines are contraindicated in pregnancy and lactation**
Trichomonas vaginalis	*Trichomonas vaginalis*	Metronidazole oral 400mg 12 hourly for 7 days	
Genital herpes	*Herpes Simplex Virus*	NON PREGNANT Aciclovir oral 200mg 5 times a day for 5 days	

22. Neutropenic Sepsis

22.1 Neutropenic patients whether disease or chemotherapy induced are at highest risk of acquiring infection.



23. Gastrointestinal Infections

INFECTION	ORGANISMS	ANTIMICROBIALS	COMMENTS
Gastro-enteritis	*Salmonella sp.* *Shigella sp.* *Campylobacter sp.* Viruses	Usually NOT required unless systemic spread considered a risk (children under 6 months, the elderly, immuno-compromised and those showing signs and symptoms of systemic infection)	Ciprofloxacin oral 500mg 12-hourly if an antibiotic required. Antibiotics prolong the duration of the carrier state in salmonellosis Cases should be barrier nursed. Food poisoning is a notifiable disease.
Antibiotic associated diarrhoea	*Clostridium difficile*	**First line** Metronidazole oral 400mg 8 hourly for 14 days **Second line** Vancomycin oral 125mg 6 hourly for 14 days	**STOP** other antimicrobials if possible. For recurrent infection consider tapering vancomycin regime. (See Appendix 6) *Fidaxomicin may also be considered for patients with severe C.difficile infection where there is a high risk of recurrence – discuss with Consultant Microbiologist.*
Typhoid **Paratyphoid**	*Salmonella typhi* *Salmonella paratyphi*	Infections from Middle-East, South Asia, and South-East Asia may be multiple-antibacterial-resistant and sensitivity should be tested. Cefotaxime or Azithromycin may be alternatives in mild or moderate disease caused by multiple-antibacterial-resistant organisms. If organism sensitive use Ciprofloxacin 500mg 12 hourly	
Peptic Ulcer	*Helicobacter pylori*	Triple therapy, all twice daily x 7 days. PPI e.g. Omeprazole 20mg bd **plus** Clarithromycin 500 mg bd **plus** Amoxicillin 1g * bd (* If Penicillin allergy, use Metronidazole 400 mg bd)	Confirm presence of *H.pylori* before treating Patients are referred to GP for treatment
Acute Cholangitis /Cholecystitis	Coliforms mainly *Escherichia coli* rarely *Pseudomonas aeruginosa* or anaerobes	Co-amoxiclav IV 1.2g 8 hourly **Or** Piperacillin/tazobactam IV 4.5g 8-hourly **plus** metronidazole IV 500mg 8 hourly	Alternative for penicillin allergy Meropenem 1-2 g 8 hourly
Diverticulitis	Mixed infection, coliforms and anaerobes	Piperacillin/tazobactam IV 4.5g 8 hourly **plus** Metronidazole IV 500mg 8 hourly **plus** *Gentamicin IV once daily dosing	Alternative for penicillin allergy: **Vancomycin IV continuous infusion **plus** Ciprofloxacin IV 400mg 12-hourly **plus** Metronidazole IV 500mg 8-hourly
Pancreatitis (Severe)	Mixed infection, coliforms and anaerobes	Piperacillin/tazobactam IV 4.5g 8 hourly **+/- ***Gentamicin IV once daily dosing	Antibiotics only required for patients with severe disease
Peritonitis **Peritonitis** (Spontaneous bacterial peritonitis)	Mixed organisms	Piperacillin/tazobactam IV 4.5g 8 hourly **plus** Metronidazole IV 500 mg 8 hourly	Alternative for penicillin allergy: **Vancomycin IV continuous infusion **plus** Ciprofloxacin IV 400mg 12-hourly **plus** Metronidazole IV 500mg 8-hourly

**for gentamicin dosing see Appendix 3*

** for vancomycin dosing see *Appendix 5*

24. Surgical Prophylaxis

24.1 General Principles

24.1.1 Choice of Antimicrobial

- The selected antimicrobial for prophylaxis must cover the expected pathogen for that operative site.
- If patient is known to be a **MRSA** carrier, then Teicoplanin IV 400mg (6mg/kg if body weight > 70kg) *must* be given in addition.
- If patient known to be ESBL positive, Meropenem IV 1-2g should be used as appropriate.

24.1.2 Timing of Antimicrobial

- For surgical procedures. Intravenous prophylactic antibiotics should be given **within 60 minutes before the skin is incised** and as close to time of incision as practically possible.

24.1.3 Duration of Prophylaxis

- A **single dose** gives proven effective prophylaxis
- In prolonged procedures (more than 4 hours) or, if significant blood and fluid loss (>1,500ml), a second dose may be justified
- Up to 24 hours of antibiotic prophylaxis for arthroplasty

24.1.4 Re-dosing of Antimicrobials

- For procedures lasting > 4 hours or intra-operative blood loss > 1,500ml, the following antibiotics should be **re-dosed 4 hours after administration of the initial dose**:

Amoxicillin

Cefuroxime

Co-amoxiclav

Piperacillin/Tazobactam

Flucloxacillin

Do not re-dose teicoplanin and gentamicin because ototoxicty and/or nephrotoxicity may result. These antibiotics have a long half-life

24.2 GI and Biliary Surgery

Procedure	First Choice	Alternative Choice
Colorectal surgery	Pipercillin/tazobactam IV 4.5g **and** Metronidazole IV 500mg	Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Teicoplanin IV 400 mg (if over 70 kgs, 6 mg/kg) **and** Metronidazole IV 500mg
Appendectomy	Pipercillin/tazobactam IV 4.5g **and** Metronidazole IV 500mg	Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** Metronidazole IV 500mg
Upper Gastro-intestinal Surger	Co-amoxiclav IV 1.2g **and** Metronidazole IV 500mg	Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** Metronidazole IV 500mg
Percutaneous Endoscopic Gastrostomy	Co-amoxiclav IV 1.2g	

24.3 Biliary Tract, Hepatic, Pancreatic Surgery

Procedure	First Choice	Alternative Choice
Open Biliary/pancreatic surgery or Liver Surgery	Co-amoxiclav IV 1.2g **and** Metronidazole IV 500mg	Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** Metronidazole IV 500mg
Endoscopic Retrograde Cholangio-pancreatography (ERCP)		
• No obstruction present	No antibiotic required	No antibiotics required
• Obstruction present	Piperacillin/tazobactam IV 4.5g 1-2 hours prior to procedure	Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** Metronidazole IV 500mg
Hernioraphy (when mesh used)	Co-amoxiclav IV 1.2g	

24.4 ENT

Procedure	First Choice	Alternative Choice
Head and Neck Surgery (including Thyroid/Parotid) (contaminated/clean contaminated)	Co-amoxiclav IV 1.2g **and** Metronidazole IV 500mg	Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** Metronidazole IV 500mg
Head and neck surgery (clean)	Not required	
Mastoid Surgery including abscess	Co-amoxiclav IV 1.2g **and** Metronidazole IV 500mg	Drainage and treatment, when confirmed
Ear/Nose Surgery with suspected meningitis	Ceftriaxone IV 2g **and** Metronidazole IV 500mg	If treatment is required follow the protocol for management of meningitis.
Nose or Sinus Surgery (clean)	Not required	-
Sinus Surgery (contaminated)	Co-amoxiclav IV 1.2g **and** Metronidazole IV 500mg	-
Functional Endoscopic Sinus Surgery (FESS)	Co-amoxiclav IV 1.2g **and** Metronidazole IV 500mg	-
Tonsillectomy (clean)	Not recommended	-
Tonsillectomy (contaminated)	Co-amoxiclav IV 1.2g	-
Skull base Surgery	Co-amoxiclav IV 1.2g **and** Metronidazole IV 500mg	-
Tracheostomy (clean)	Not required	-
Tracheostomy (contaminated)	Co-amoxiclav IV 1.2g	-

24.5 Urogenital Surgery

Procedure	First Choice	Alternative Choice
Transurethral resection of prostrate (TURP)	Gentamicin IV 240mg **and** Oral Trimethoprim 200mg 12 hourly for 5/7	Co-amoxiclav IV 1.2g
Transrectal Prostatic Biopsy (TRUS)	Gentamicin IV 240mg **plus** oral Ciprofloxacin 500mg X 3 doses 12 hours apart.	
History of UTI/urethral dilatation/bladder biopsy/diathermy	Gentamicin IV 240mg	Co-amoxiclav IV 1.2g
Percutaneous Nephrolithotomy (PCNL)	Gentamicin IV 240mg **and** Oral Trimethoprim 200mg 12 hourly for 5/7	Co-amoxiclav IV 1.2g
Ureteroscopic stent placement	Gentamicin IV 240mg	Co-amoxiclav IV 1.2g
Flexible cystoscopy	Low Risk – None High Risk – oral Trimethoprim 200mg 12 hourly for 5/7	
Ureteric Stent	Gentamicin IV 240mg	

24.6 Biliary Procedures

Procedure	First Choice	Type 1 Penicillin Allergy
Percutaneous Transhepatic Drainage + Stent	Co-amoxiclav IV 1.2g **and** Metronidazole IV 500mg	Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** Metronidazole IV 500mg
Percutaneous Transhepatic Cholecystostomy	Co-amoxiclav IV 1.2g **and** Metronidazole IV 500mg	Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** Metronidazole IV 500mg
Cholangiogram	Co-amoxiclav IV 1.2g **and** Metronidazole IV 500mg	Gentamicin IV 240mg **and** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** Metronidazole IV 500mg
Transjugular Intrahepatic Portosystemic Shunt (TIPS)	Co-amoxiclav IV 1.2g	

24.7 Obstetrics and Gynaecological Surgery

Procedure	First Choice	Type 1 Penicillin Allergy
Caesarean Section	Co-amoxiclav IV 1.2g **Or** Meropenem IV 1 – 2g	Gentamicin IV 240mg (or ciprofloxacin 400 mg if renal impairment) **and** teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** metronidazole IV 500mg
Hysterectomy	Co-amoxiclav IV 1.2g	Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** Metronidazole IV 500mg
Other Gynaecological Procedures	Co-amoxiclav IV 1.2g	Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **and** metronidazole IV 500mg
IUD for emergency contraception in woman who have risk of sexually transmitted infection	Azithromycin oral 1g single dose	Doxycycline oral 100mg 12-hourly for 7 days
Termination of pregnancy	Over 20 years: Doxycycline oral 100mg 12-hourly for 7 days Under 20 years: Azithromycin oral 1g on day of termination.	See 1st line

24.8 Ophthalmic Surgery

Procedure	First Choice	Type 1 Penicillin Allergy
Cataract Surgery (see Appendix 11) *Intracameral antibiotics are given at the time of surgery to reduce the risk of post-operative bacterial endophthalmitis.*	Cefuroxime 1mg in 0.1ml, intracameral injection	Moxifloxacin 100micrograms in 0.1ml intracameral injection **plus** Vancomycin 1mg in 0.1ml intracameral injection
	<u>Discharge Medication:</u> Chloramphenicol eye drops 0.5% qds for 2 weeks **plus** dexamethasone eye drops 0.1% qds for 4 weeks	

24.9 Orthopaedic Surgery

Procedure	First Choice	Type 1 Penicillin Allergy
Joint aspiration, arthroscopy, short/clean non-implant surgery	No antibiotic prophylaxis recommended	
Elective implant surgery – e.g. joint replacement	Cefuroxime IV 1.5g **and** two further doses of 750mg, 8 hours apart If ever been MRSA positive or at high risk of MRSA: **ADD** Teicoplanin IV 400mg (if over 70 kgs, 6 mg/kg) for 3 doses at 12 hourly intervals	Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) for 3 doses at 12 hourly intervals **and** Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Metronidazole IV 500mg
Closed manipulation of fractures	No antibiotics required	
Contaminated fractures, open fractures and hip hemiarthroplasty for fracture	Pipercillin/Tazobactam IV 4.5g **and** Metronidazole IV 500mg If ever been MRSA positive or at high risk of MRSA: **ADD** Teicoplanin IV 400mg (if over 70 kgs, 6 mg/kg)	Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) for 3 doses at 12 hourly intervals **and** Gentamicin IV 240mg (or Ciprofloxacin 400 mg if renal impairment) **and** Metronidazole IV 500mg

24.10 Vascular Surgery

Antibiotic Prophylaxis in Elective Low Risk Vascular Surgery For patients undergoing prosthetic graft or stent insertion consult the High Risk Procedure Policy. The choice of agent to be used for prophylaxis is dependent upon the patients' current MRSA carrier status and past history of penicillin anaphylaxis. There is increasing evidence that in many instances single dose antibiotic prophylaxis provides the same benefits and fewer adverse effects than multiple dose regimens. The initial dose of antibiotic should ideally be administered at induction of anaesthesia. In instances where a tourniquet is applied the antibiotic should be administered at least 10 minutes before its application.	**Patients with no previous history of penicillin anaphylaxis:** If MRSA Negative: Co-amoxiclav 1.2 g given by IV bolus over at least 4 minutes. Further doses should be given for prolonged procedures or where there is significant blood loss (>1,500ml) or haemodilution. When indicated, further doses should be given during the procedure, 4 hours after the previous dose. (See guidance on page 43) **Patients with previous history of penicillin anaphylaxis and/or MRSA +ve / unknown MRSA status:** Teicoplanin 400 mg (if over 70 kgs, 6 mg/kg) **PLUS** Ciprofloxacin IV 400mg .	Teicoplanin IV 400 mg (if over 70 kgs, 6 mg/kg) and **EITHER** Metronidazole IV 500mg **OR** Clindamycin IV 600mg
Elective High Risk Vascular Surgery - applies to those patients undergoing prosthetic graft or stent insertion. Consult the Low Risk Procedures Policy for patients not undergoing prosthetic graft or stent insertion. The initial dose of antibiotic should ideally be administered at induction of anaesthesia. In instances where a tourniquet is applied the antibiotic should be administered at least 10 minutes before its application.	Piperacillin/tazobactam IV 4.5 mg **plus** Teicoplanin IV 400 mg (if over 70kg give 6mg/kg) Add Metronidazole IV 500mg STAT for patients at particular risk of anaerobic infection (e.g. patients with gangrene, diabetes or undergoing amputation) **Post-operative antibiotic prophylaxis:** Piperacillin/tazobactam may be given 8 hourly for 48 hours plus 2 further doses of Teicoplanin at 12 hourly intervals at dosage indicated above	If treatment required use piperacillin/tazobactam IV 4.5 mg 8-hourly **plus** **Vancomycin by continuous IV infusion keeping levels 10-25 mg/l *** for vancomycin dosing see Appendix 5*

24.11 Clinical Radiology

Transrectal ultrasound biopsy of prostate gland	Co-amoxiclav IV 1.2g immediately prior to procedure	Gentamicin IV 3mg/kg immediately prior to procedure and Metronidazole 1g suppository TWO hours prior to procedure
Interventional billiary/uroradiological procedures	Ceftriaxone IV 1g before the procedure	

25. Medical Prophylaxis

Recommended prophylactic antibiotics for common conditions

INDICATION	ANTIMICROBIALS
Meningococcal Disease/Meningitis contacts **(see also section 13.4)**	Ciprofloxacin (oral) Adult: 500 mg single dose Child 5-12 yrs 250mg as single dose Child 1 month-4 yrs 125mg as a single dose Rifampicin (oral) Adult: 600mg 12 hourly for 2 days Child 1- 12 years: 10mg/kg (max 600mg) 12 hourly for 2 days Child under 1year: 5 mg/kg for 2 days Ceftriaxone IM 250mg single dose Child under 12 years 125mg single dose Use Ceftriaxone for pregnant women
Haemophilus Influenzae type b disease contacts	Rifampicin (oral) Adult: 600 mg daily for 4 days Child (over 3 months): 20 mg/kg (max 600mg) daily for 4 days Child (1-3 months): 10 mg/kg daily for 4 days
Post splenectomy / Asplenic patients	Please refer to post-splenectomy prophylaxis guide (Appendix 7)
Tuberculosis Prophylaxis (Susceptible close contacts or those who have become tuberculin positive)	Isoniazid oral Adult: 300 mg od for 6 months Child: 5mg/kg od (max. 300 mg od) **or** Adult: Isoniazid 300 mg od **plus** rifampicin 600 mg od (450 mg if less than 50kg) for 3 months Child: Isoniazid 5mg/kg od (max 300mg) **plus** Rifampicin 10mg/kg od (max 450mg if body weight less than 50kg or max 600mg if body weight more than 50kg) **Or if isoniazid-resistant tuberculosis in patients under 35 years:** Adult: Rifampicin 600 mg od (450 mg if less than 50 kg) for 6 months Child: 10 mg/kg daily (max. 450 mg daily if body-weight less than 50 kg; max. 600 mg daily if body-weight over 50 kg)
HIV Post Exposure Prophylaxis (see also Appendix 8)	**Truvada** tablet - *ONE tablet ONCE a day* **plus** **Raltegravir** tablet - *ONE tablet TWICE a day*

26. Burns and Plastics

26.1 Burns

- Burns patients get raised temperatures. Antibiotics should only be used for specific indications and not as prophylaxis.
- An attempt should be made to isolate an organism before starting treatment, although empirical use on clinical grounds may occasionally be necessary and you would be guided in this circumstance.
- Blood culture should be taken aseptically from a peripheral vein whenever sepsis is suspected. (Line tips should not be sent for culture. If lines are being changed in a septic patient cultures should be done through the line prior to removal).

Specific Indications:

Infection	Antimicrobials	Comments
Inhalation Injury	No antibiotics indicated unless subsequent infection	*If community acquired chest infection treat as per CAP guideline.* **for gentamicin dosing see Appendix 3*
Pneumonia secondary to inhalation injury	Guided by culture and sensitivity results where possible. Empirical therapy: Benzylpenicillin IV 1.8g 4-hourly plus * Gentamicin IV once daily dosing	
Burn wound infection - cellulitis	Flucloxacillin IV 2g six-hourly (child dose: 30mg/kg four-hourly) **plus** *Gentamicin IV once daily dosing	
Systemic sepsis	Piperacillin/tazobactam IV 4.5g 6-hourly **and** *Gentamicin IV once daily dosing.	
Surgical Prophylaxis	To be given on induction of anaesthesia (including escharotomy or Biobrane) Benzylpenicillin IV 1.8g 6-hourly (child dose: 25mg/kg) **and** *Gentamicin IV once daily dosing	*Maximum 48 hours: for older wounds check recent swab results to guide appropriate prophylaxis.* *For **penicillin allergy** replace Benzylpenicillin with Teicoplanin IV 400mg (6mg/kg if >70kg)*
Toxic Child	Benzylpenicillin IV 25mg/kg every 4 hours **plus** *Gentamicin IV once daily dosing	
Toxic Shock Syndrome	Flucloxacillin IV 2g 6-hourly **plus** *Gentamicin IV once daily dosing	

26.2 Plastics

PROCEDURE	ANTIMICROBIALS
Minor and Intermediate Surgery	No antibiotic prophylaxis
Any Free Flap	Co-amoxiclav IV 1.2g on induction and 5 further doses 8 hourly (48 hours prophylaxis) **If penicillin allergic (Not Type 1):** Cefuroxime IV 1.5g **and** Metronidazole IV 500mg at induction and 5 further doses of Cefuroxime IV 750mg 8 hourly (48 hours prophylaxis) **In penicillin allergy with type 1 reaction avoid all beta-lactam antibiotics:** *Teicoplanin IV 400mg (if over 70 kg, 6mg/kg) and Gentamicin IV 240mg at induction and 2 further doses of *Teicoplanin IV 400mg 12-hourly (if over 70 kg, 6mg/kg)
Major Surgery / Implantation	Co-amoxiclav IV 1.2g on induction and 5 further doses 8 hourly (48 hours treatment) **If penicillin allergic (Not Type 1):** Cefuroxime IV 1.5g **and** Metronidazole IV 500mg at induction and 5 further doses of Cefuroxime IV 750mg 8 hourly (48 hours prophylaxis) **In penicillin allergy with type 1 reaction avoid all beta-lactam antibiotics:** *Teicoplanin IV 400mg (if over 70 kg, 6 mg/kg) and Gentamicin IV 240mg at induction and 2 further doses of *Teicoplanin IV 400mg 12 hourly (if over 70 kg, 6mg/kg)
Breast Reduction / Breast Augmentation	Co-amoxiclav IV 1.2g on induction **If penicillin allergic (Not Type 1):** Cefuroxime IV 1.5g **and** Metronidazole IV 500mg at induction **In penicillin allergy with type 1 reaction avoid all beta-lactam antibiotics:** *Teicoplanin IV 400mg (over 70kg, 6 mg/kg) and Gentamicin IV 240mg at induction
Hand Emergencies ****Major – large open wounds** **Significant crush element** **Replantation or revascularisation** **Contact with earth (garden injuries) + very mucky** ****Minor Hand Emergencies**	**Start antibiotics on admission** Gentamicin IV 240mg once daily **and** Benzylpenicillin IV 1.2g 6 hourly **and** Metronidazole IV 500mg 8 hourly **Continue this regimen for 48 – 72 hours and then review the need for continuing antibiotics; or review before then in the light of microbiology results** Flucloxacillin 500mg 6 hourly for 5 days **Or** Erythromycin 500mg 6 hourly for 5 days
PROCEDURE	**ANTIMICROBIALS**

Leeches – prophylaxis against Aeromonas hydrophila infection	*Gentamicin once daily dosing if less than 5 days **Or** Ciprofloxacin PO 500mg 12-hourly (for duration of leech therapy)

CLEFT SURGERY PROPHYLAXIS – note dosages will depend on age of patient	
PROCEDURE	**ANTIMICROBIALS**
Cleft lip primary repair Cleft lip revision Cleft palate primary repair Cleft palate fistula repair Cleft palate re-repairs Submucous cleft palate Buccal flaps Pharyngoplasty	Benzylpenicillin IV 25mg/kg (max 2.4g) single dose on induction **If penicillin allergic <u>or</u> if ever been MRSA positive or is at high risk of MRSA:** Teicoplanin IV Age < 1 month: 16mg/kg single dose on induction Age > 1 month: 10mg/kg (max 400mg) single dose on induction If patient is found to be MRSA positive and a need for MRSA treatment is identified, give Gentamicin plus Teicoplanin
Alveolar bone graft	Penicillin V for 7 days + Metronidazole for 7 days + chlorhexidine mouthwash for 2 weeks
Septoplasty	None required
Rhinoplasty – closed	None required
Rhinoplasty – open tip	Co-amoxiclav IV 1.2g on induction

** Treat as infected wound, hence need for longer time of antibiotics, all other scenarios reflect prophylaxis

APPENDIX 1: Penicillin Allergy Guide

Penicillin Allergy

All drug-allergies must be documented on the medication chart with the patient's reaction

- Patients with type 1 penicillin allergy (see below) must not be prescribed and administered penicillin based drugs (e.g. Co-amoxiclav, piperacillin/tazobactam (Tazocin), meropenem).
- Do not decide on a diagnosis of penicillin allergy until you have obtained a detailed history of the patient's reaction.
- The clinical symptoms of a **true Type I** allergy to penicillin are urticaria, laryngeal oedema, bronchospasm, hypotension, or local swelling within 72 hours of administration. **These patients should not receive penicillin or any beta-lactam antibiotic of any kind.**
- Patients who have penicillin allergy documented, but where it is not possible to ascertain the exact reaction should also be managed in a similar manner to patients with known type 1 allergy.
- Patients who have had a non-severe rash may be given cephalosporins and other beta-lactam antibiotics but not penicillin based drugs.
- Patients with a history of **intolerance** to penicillin e.g. Gastro-intestinal upset after administration are probably not truly allergic to penicillin.

Always

- Record allergies including the symptoms carefully in the notes and on the drug chart. Ensure patient has red wrist band stating allergy.
- Check with the patient and review the allergy section of the drug chart prior to all drug administrations.

Contraindicated (in severe infection seek microbiology advice*)

Amoxicillin	Co-Fluampicil (Magnapen®)	Piperacillin/tazobactam
Ampicillin	Flucloxacillin	(Tazocin®)
Benzylpenicillin	Penicillin V	Temocillin (Negaban)
Co-amoxiclav (Augmentin®)	(phenoxymethylpenicillin)	Ticarcillin (Timentin®)

Caution (for use only in patients with non-type 1 allergy)

DO NOT USE in patients with **Type 1** penicillin allergy (anaphylaxis, breathing difficulties, facial swelling, urticarial rash or other major skin reactions).

If in doubt contact the on-call Consultant Microbiologist via switch board

Cephalosporins:		**Other beta-lactam antibiotics:**
Cefaclor	Cefradine (Cephradine)	*Doripenem*
Ceftazidime	Ceftazidime	Ertapenem
Cefalexin (Cephalexin)	Ceftriazone	Imipenem
Cefotaxime	Cefuroxime	Meropenem
Cefixime		Aztreonam

Considered Safe

Amikacin	Daptomycin	Nitrofurantoin
Azithromycin	Doxycycline	Norfloxacin
Ciprofloxacin	Erythromycin	Sodium Fusidate (Fucidin®)
Clarithromycin	Gentamicin	Teicoplanin
Clindamycin	Levofloxacin	Tigecycline
Colistin	Linezolid	Trimethoprim
Cotrimoxazole (Septrin®)	Metronidazole	Tobramycin
	Moxifloxacin	Vancomycin

APPENDIX 2: Invasive Group A streptococcal infection/Necrotising Fasciitis

The mortality of Group A streptococcal necrotising fasciitis (GAS NF) is up to 53% (overall mortality for invasive Group A Streptococcal (GAS) infections 27-30%).

Risk Factors for GAS infection

- NSAIDs.
- Minor trauma/surgery/eczema/broken skin.
- Child birth/vaginal colonisation with GAS - note not purulent discharge
- IDDM.
- Post Varicella infection

Pathogenesis

Invasive strains produce enzymes and toxins that degrade connective and soft tissues hence the term beloved of the media “flesh eating bug”. These include:

- Pyrogenic exotoxins – may give scarlet fever like rash.
- Haemolysin.
- Hyaluronidase.
- Streptokinase.
- Super antigen production – causes excessive T cell stimulation and massive “septic shock “type symptoms.

Look out for these (often confusing) clues to severe strep infection:

- Flu like illness with lots of myalgia out of season for flu.
- Diarrhoea.
- Confusion, backache, rigors.
- Rarely - history of sore throat.
- Discharge – may be vaginal or wound typically sero-sanguinous.
- Exquisite Pain/ tenderness anywhere think - GAS NF/ GAS myositis.

Characteristically there is no obvious entry site or primary focus visible for a GAS necrotising fasciitis. There may be a history of recent minor trauma e.g. knocking a limb against furniture etc. Typically:

Local swelling, redness, intense pain – pain may be decreased in polyneuropathy of diabetics.
Very rapid spread within 24-72 hours- often not visible to naked eye until late.
Systemic toxicity – up to 20% of the elderly will not have a raised temperature.
Apathy, confusion, decreased level of consciousness, hypotension may have a rash.
May be minimal apparent involvement of the skin overlying the exquisitely tender area despite rapid subcutaneous spread of infection.
A dusky hue with an irregular pattern of spread of purple areas of necrosis heralds impending gangrene (Melaney’s gangrene).

Patients with possible iGAS must be referred promptly for ITU and surgical assessment

Aggressive surgery removes the source of infection and toxins, and removal of infarcted tissue improves the penetration of antibiotics.

Early thorough debridement is essential

Sporadic cases and difficulty in early recognition of NF make randomised double-blind controlled trials impossible. There are no evidence based-guidelines regarding the optimal management of NF and a pragmatic approach must be adopted.

Gram stain of aspirates or biopsies have poor sensitivity and the fulminant nature of the infection make broad-spectrum empirical therapy covering most types of NF imperative.

Subsequent rationalisation of antibiotic may be based on culture data.

Antimicrobial Prescribing in Necrotising Fasciitis

Although Group A streptococci remain penicillin sensitive, the high tissue concentrations in GASNF result in most organisms being in a stationary phase, rendering cell-wall-active antimicriobials ineffective (the Eagle' effect)

Clindamycin has the benefit of switching off exotoxin production even in stationary phase organisms, and GASNF patients treated with clindamycin have a significantly lower mortality than those not receiving clindamycin: 14% vs 60% (odds ration: 0.13; 95% confidence interval 0.02-0.08; p=0.03). Clindamycin usage strongly protects against mortality.

In order to provide adequate cover for synergistic and exotoxin producing Gram-positive NF, empirical antibiotics recommended are intravenous clindamycin 600 mg – 1.2 g six-hourly together with intravenous meropenem 1 – 2 g eight-hourly. (Pending culture results)

When MRSA is suspected, intravenous linezolid 600 mg twice daily or daptomycin 6mg/kg may be added in preference to vancomycin, as the latter has no effect on exotoxin production.

For suspected Vibrio spp. NF, therapy with doxycycline 100 mg twice daily plus intravenous ceftazidime 2g eight hourly is recommended. Ciprofloxacin may be an alternative.

In GASNF with additional myositis and myonecrosis, where superantigens abound, usage of IVIG is worth considering. 2 g/kg, with the option of a second dose if necessary after 24 h. Infusion is started initially at a rate of 20 mL/h, increasing incrementally after 10 min to a maximum of 160 mL/h.

APPENDIX 3: Guideline for the use of once daily gentamicin in adults

Background

Gentamicin is the aminoglycoside of choice and is widely used for the treatment of serious infections. It is active against many strains of Gram-positive and Gram-negative pathogens including Pseudomonas aeruginosa but it is not effective against Streptococci.

Gentamicin must only be used under expert supervision as it is both nephrotoxic and ototoxic. It must not be used in patients with abnormal renal function except by renal physicians.

NB: For gentamicin dosing and monitoring in endocarditis, see section 12.9.

Prescribing

When prescribing gentamicin on the drug chart ensure there is at least 24 hours between doses - check for STAT doses on the front page of the admission booklet and the once only section of the drug chart.

Dose of Gentamicin in normal renal function

16-60 years: 5 mg/kg once a day up to a maximum of 400 mg IV once a day
60+ years: 3 mg/kg once a day up to a maximum of 400 mg IV once a day

The dose should not normally exceed 400 mg once a day and patients should not be given more than 5 days of gentamicin.

Gentamicin prescriptions will have an automatic stop at 5 days, unless rewritten with clear clinical justification. If more than 5 days of gentamicin is anticipated, baseline audiometry must be measured and kept under review.

Patients must not be discharged from hospital on gentamicin.

Gentamicin dosing in obesity

As gentamicin is not very fat soluble and is poorly distributed in adipose tissue, the dosage needs to be adjusted in obese patients.

If the actual body weight (ABW) is >20% above the ideal body weight (IBW), use corrected body weight (CBW) to calculate the dose:

IBW:	Male	50 kg + 2.3 kg per inch over 5 feet
	Female	45.5 kg + 2.3 kg per inch over 5 feet

CBW = IBW + 0.4 (ABW – IBW)

NB: Some patients with high lean body mass may require a higher dose but this must never exceed 520 mg and should only be initiated on advice of a consultant.

Administration

Administer in 100 ml glucose 5% or sodium chloride 0.9% over 60 minutes.

Monitoring

(a) Gentamicin levels

- Levels should be taken from a peripheral venepuncture and must not be taken from any lumen of any line through which gentamicin has ever been given.
- A trough level should be taken 23-24 hours post dose.
- The first level should be taken just before the 3rd dose. Thereafter, in patients with stable renal function, levels are taken every 3 days.
- For patients with abnormal renal function, pre-dose gentamicin levels should be checked before each dose.
- Record the actual time when the blood is taken on the blood sciences request form. It is essential that this is recorded accurately.
- Blood for gentamicin level should be put in a red top bottle.

(b) Adverse Effects

- **Nephrotoxicity** - renal function must be checked regularly as gentamicin has nephrotoxic potential. If renal function deteriorates treatment with gentamicin must to be discontinued.
- **Vestibular and ototoxicity** secondary to gentamicin is independent of drug concentration and is suggested by any of the following: dizziness, unsteadiness on feet, tinnitus, bobbing oscilopsia (vertical bouncing of surroundings), hearing loss, nausea or vomiting. Toxicity is associated with prolonged gentamicin use and is secondary to drug accumulation within the inner ear. Patients receiving gentamicin for more than 72 hours should be warned of this potential side effect and therapy should be discontinued at the earliest sign of toxicity.

Interpretation of Assay Results:

Pre Dose Level (23-24 hrs post-dose)	**Interpretation / Action**
Gentamicin < 1 mg/l	Satisfactory - continue current therapy
Gentamicin > 1 mg/l	**Delay/omit next dose - seek further advice.** Consider reasons for pre-dose levels being high: • Check that the dose of gentamicin and the timing of the level are correct • Check that the blood sample was not taken from the line that gentamicin was administered through. • Check renal function as a high level may be associated with worsening renal function.

APPENDIX 4: Guidelines for the use of once daily Amikacin in adults

Background

Amikacin is an aminoglycoside antibiotic which exhibits a concentration dependent activity and a post antibiotic effect. It should only be prescribed where indicated by microbiology culture and sensitivity results or on advice of a consultant microbiologist. It has both nephrotoxic and ototoxic potential and should therefore be used under expert supervision.

If more than 3 days of amikacin anticipated, baseline audiometry should be measured and kept under review

Prescribing

Dose of Amikacin in normal renal function

15mg/kg once daily. Maximum 1.2g daily

NB: Maximum lifetime cumulative dose = 15 grams (high risk of ototoxicity if exceeded)

Ensure expert supervision in renal impairment.

Amikacin dosing in obesity

As Amikacin is not very fat soluble and is poorly distributed in adipose tissue, the dosage needs to be adjusted in obese patients.

If the actual body weight (ABW) is >20% above the ideal body weight (IBW), use corrected body weight (CBW) to calculate the dose:

IBW:	Male	50 kg + 2.3 kg per inch over 5 feet
	Female	45.5 kg + 2.3 kg per inch over 5 feet

CBW = IBW + 0.4 (ABW – IBW)

Administration

Intravenous bolus over 2-3 minutes. May be diluted with 10-20ml Sodium Chloride 0.9% or Glucose 5%.

Doses must be given at prescribed time otherwise interpretation is difficult. It is important to record on drug card exactly what time dose was given.

Monitoring

Levels should be taken from a peripheral venepuncture and must not be taken from any lumen of any line through which amikacin has ever been given. Levels (trough only, peaks are not done) should be taken 23-24 hours post dose. The first level should be taken before the 3rd dose. Thereafter, in patients with stable renal function, levels are taken every 3 days.

Record the actual time when the blood is taken on the blood sciences request form.
It is essential that this is recorded accurately.

Interpretation of Assay Results

Pre Dose Level (23-24 hrs post-dose)	**Interpretation/Action**
Amikacin < 5 mg/l	Satisfactory - continue current therapy
Amikacin > 5 mg/l	**Delay/omit next dose -** take another level 12 hours later. Do not administer more amikacin until level <5mg/l. Consider reasons for pre-dose levels being high: • Check that the dose of amikacin and the timing of the level are correct • Check that the blood sample was not taken from the line that amikacin was administered through. • Check renal function as a high level may be associated with worsening renal function.

APPENDIX 5: Guidelines for the use of Vancomycin in Adults by continuous infusion

Background

The efficacy of vancomycin depends on the time for which the serum concentration exceeds the minimum inhibitory concentration for the micro-organism rather than the attainment of high peak concentrations. There is evidence that giving vancomycin as a continuous infusion over 24 hours is as effective as the traditional method of intermittent infusions whilst being much simpler to organise in terms of monitoring serum levels.

Vancomycin has a potentially toxic side effect profile, which includes nephrotoxicity and ototoxicity. Avoid using in patients with previous hearing loss and discontinue if tinnitus occurs. Regular blood monitoring is required.

Prescribing

(1) Loading dose

All patients should receive a weight-related loading dose, prescribed on the *Once Only & Premedication Drugs* section on front of drug chart:

(a) Central administration	
< 65kg	**1g IV** over **60 minutes** in 100mL sodium chloride 0.9%
> 65 kg	**1.5g** IV over **60 minutes** in 250mL sodium chloride 0.9%

(b) Peripheral administration	
< 65kg	**1g IV** over **100 minutes** in 250mL sodium chloride 0.9%
> 65 kg	**1.5g** IV over **150 minutes** in 500mL sodium chloride 0.9%

(2) Maintenance dose - continuous 24hr infusion

The continuous intravenous infusion should follow immediately after the loading dose and should be based on an estimate of the patient's renal function.

	Estimated creatinine clearance* (ml/min)	Starting daily **vancomycin dose**
Normal renal function	> 50	2 g
Mild impairment	20-50	1.5 g
Moderate impairment	10-20	1 g
Severe impairment	< 10	500 mg
Filtration /Diafiltration	-	1000 mg

** Creatinine clearance can be estimated using the Cockroft-Gault equation:*

$$CrCl = \frac{A\ (140-age)\ wt\ (kg)}{Serum\ Cr}$$ *(Where A= 1.23 in males & 1.04 in females)*

- To prevent the prescription of vancomycin being missed on ward rounds, prescribe in the *Antimicrobial* section of the drug chart:

  'Vancomycin continuous IV infusion as per protocol'

- Prescribe the 24 hour infusion on the *Infusions and IV therapy* section on the back of the drug chart. For central line administration, prescribe as separate infusions of 500mg in 50mL sodium chloride 0.9% (for rate of infusion see administration instructions).

Administration instructions

Determine whether vancomycin is to be administered centrally or peripherally. An infusion pump must be used to administer vancomycin infusions.

(1) Loading dose

- **Peripheral line:** Vancomycin **1 g in 250ml** sodium chloride 0.9% over **100 minutes**
- **Peripheral line:** Vancomycin **1.5 g in 500ml** sodium chloride 0.9% over **150 minutes**
- **Central line:** Vancomycin **1 g in 100mL** sodium chloride 0.9% or **1.5 g in 250 mL** sodium chloride 0.9% over **60 minutes.**

(2) Maintenance dose - continuous 24hr infusion

- For **peripheral line** administration:

Reconstitute each vancomycin 500mg with 10ml water for injection. REMEMBER for each reconstituted vial (10ml) to remove the same volume from the infusion bag.

Vancomycin Total daily dose	Volume of infusion bag to administer via peripheral line	Volume to be removed from infusion fluid bag before adding vancomycin	Concentration of vancomycin in infusion bag	Infusion rate using an infusion pump mL/hour (mg/hour)
3g	**1000ml**	**60ml**	**3000mg in 1000ml (3mg/ml)**	**41.7 (125)**
2.5g	**500ml**	**50ml**	**2500mg in 500ml (5mg/ml)**	**20.8 (104)**
2g	**500ml**	**40ml**	**2000mg in 500ml (4mg/ml)**	**20.8 (83)**
1.5g	**500ml**	**30ml**	**1500mg in 500ml (3mg/ml)**	**20.8 (63)**
1g	**250ml**	**20ml**	**1000mg in 250ml (4mg/ml)**	**10.4 (42)**
500 mg	**250ml**	**10ml**	**500mg in 250ml (2mg/ml)**	**10.4 (21)**
250 mg	**250ml**	**5ml**	**250mg in 250ml (1mg/ml)**	**10.4 (10)**

NB Discard any remaining solution after 24 hours. Record the infusion stop time when the bag is stopped or changed

- For **central line** administration:

Reconstitute vancomycin 500 mg with 10mls water for injection. Then make up vancomycin 500mg to 50mls with sodium chloride 0.9%.

Each 50ml vancomycin infusion should be administered using an infusion pump and started immediately after the previous one, the rate being adjusted as in the table below.

Vancomycin Total daily dose	**Infusion rate via a** central **line using a syringe driver (500mg in 50ml) mL/hour (mg/hour)**
3000 mg (3.0 g)	**12.5 (125)**
2500 mg (2.5 g)	**10.4 (104)**
2000 mg (2.0 g)	**8.3 (83)**
1500 mg (1.5 g)	**6.3 (63)**
1000 mg (1.0 g)	**4.2 (42)**
500 mg (0.5 g)	**2.1 (21)**

Monitoring and Dose Adjustments

- Request a serum level every day at 08.00 hours. If treatment with vancomycin started within 4 hours of the usual 08.00 hours level, wait for the next morning's level to adjust the dose. LEVELS MUST BE TAKEN AT THE SAME TIME EVERY DAY so do not wait for the phlebotomist to take the blood sample.

- As soon as the serum level is known record level on chart and adjust the dose according to the table. Prescribe a new 24 hour infusion.

Vanc level	**Dosage change required**
< 10 mg/L	Increase the dose by 500mg
10 – 25 mg/L	**No change**
> 25 mg/L	Decrease the dose by 500mg*
> 30 mg/L	Stop infusion for 6hrs and restart at a reduced dose (as agreed on ward round)

*If the patient is only receiving 500 mg /day, the dose should be decreased to 250 mg /day

- For some infections including infective endocarditis and where recommended by a consultant microbiologist, levels should be maintained at 15-25mg/L.

- Monitor the insertion site closely for phlebitis.

Compatibility

- Whenever possible give via a separate lumen

Further Information

For further information contact your ward pharmacist or Medicines Information (ext. 4822)

APPENDIX 6: Guideline for tapering course of vancomycin after *Clostridium difficile* infection

Background

Longer courses using tapered vancomycin may act as a buffer, allowing time to clear *Clostridium difficile* from the intestines and allows restoration of the normal intestinal microflora.

Prescribing

If stools are still not back to normal after two weeks of metronidazole or oral vancomycin, but patient otherwise improving – continue oral vancomycin 125 mg TDS for one week.

If at the end of this time, patient continues to improve, but stools are still not back to normal, continue oral vancomycin 125 mg BD for another week.

This can continue with vancomycin 125 mg OD and then every other day for another week, until stools normalise.

If stools become more frequent again, you will need to revert to the full dose regimen of oral vancomycin 125 mg QDS for 2 weeks and then start the tapering course again.

In patients who have had *Clostridium difficile* at any time, they will be very vulnerable to destruction of normal bowel flora by antibiotics. Please avoid these as far as possible.

Once the patient has recovered, follow-up samples for clearance are not required.

APPENDIX 7: Guidelines for prevention of infections in post-splenectomy patients (Includes splenectomy checklist)

Fulminant, potentially life threatening infection is a major long term risk after splenectomy[1,2]. Most instances of serious infection are due to encapsulated bacteria such as *Streptococcus pneumoniae* (pneumococcus), *Haemophilus influenzae* type b, and *Neisseria meningitidis* (meningococcus)[3]. Other infections include *Escherichia coli*,[4] malaria,[5] babesiosis[6] and *Capnocytophaga canimorsus* (DF-2 bacillus).[7]

Because of the rapidity of onset of overwhelming post-splenectomy infection (OPSI), antibiotics should be given at the first sign of a feverish illness. If the clinical condition warrants it, and if the facilities are available, a blood culture should be taken pre-treatment. There must, however, be no delay in antibiotic administration. Intravenous benzylpenicillin should be given, as with suspected meningitis, in acutely ill cases, and the patient admitted to hospital for investigation and IV antibiotic therapy. Remember that functional hyposplenism (from conditions such as sickle cell disease and coeliac disease), will also predispose to OPSI.

There are three important aspects in the prevention of overwhelming post-splenectomy infection.

1. AWARENESS

Fortunately OPSI is rare, although some studies have shown that as many as 5% of patients without a functional spleen may die from overwhelming sepsis. Symptoms may be dramatically sudden and patients should be asked to report any febrile or other unexplained symptoms immediately. Prompt treatment may be life-saving.

2. ANTIBIOTIC PROPHYLAXIS

Most infections occur within the first two years after splenectomy, but fulminating infection has been reported 20 years post splenectomy.[8]

Lifelong regular prophylaxis should be particularly considered in those who have coincident forms of immunosuppression such as may follow cytotoxic chemotherapy. Most other adults may be treated on an intermittent basis. A short course of co-amoxiclav at therapeutic doses should be taken at the first sign of a febrile or acute respiratory illness. Patients should be advised to notify their GP that they have commenced a course. Patients without functioning spleens are also at greater risk of protozoan infections especially malaria.

Prophylactic Antibiotics

	Duration	First Line	If Penicillin Allergic
Adults	Minimum 2 years	Penicillin V 500mg bd Or Amoxicillin 500mg bd	Erythromycin 500mg bd
Children	Continued until at least 16 years old (minimum 2 years)	**1mth- 6 yrs** Penicillin V 125mg bd or amoxicillin 125mg bd **6-12 years** Penicillin V 250mg bd or amoxicillin 250mg bd **>12 years** Penicillin V 500mg bd or amoxicillin 500mg bd	**1mth- 2 yrs** Erythromycin 125mg bd **2-8 years** Erythromycin 250mg bd **>8 years** Erythromycin 500mg bd

If a patient becomes nil-by-mouth following a splenectomy, IV benzylpenicillin should be given:

Adults: IV benzylpenicillin = 1.2g bd
Children: IV benzylpenicillin = 25mg/kg bd
Additional cover with IV benzylpenicillin is *not* required if the patient is already receiving antibiotics with appropriate activity (e.g. cephalosporins, other β-lactam agents – if unsure check with microbiology). If patient is allergic to penicillin discuss with microbiology.

IMMUNISATION

When to Immunise:

ELECTIVE SPLENECTOMY	Immunise at least **TWO** (ideally 4-6) weeks prior to surgery. Prophylactic antibiotics to start *post* surgery
EMERGENCY SPLENECTOMY	Immunise at least **TWO** weeks post surgery or when sufficiently well. Prophylactic antibiotics to start *immediately*

Specialist advice should be sought for those who have received chemotherapy and radiotherapy.

Which vaccines to give:

Vaccine	Dosage/Regimen	Re-immunisation
Pneumococcal	**Children 2-12 months**: vaccination with Prevenar® according to routine immunisation schedule at 2,4 and 13 months of age + one dose of Pneumovax® II after 2nd birthday. **Children < 12 months presenting late for vaccination**: 2 doses Prevenar® separated by at least 1 month before 1st birthday and 3rd dose at 13 months + one dose of Pneumovax® II after 2nd birthday. **Children > 12 months and < 5 years previously unvaccinated / primary course not completed**: 2 doses of Prevenar® separated by 2 months + one dose of Pneumovax® II after 2nd birthday (at least 2 months after final dose of Prevenar®). **Adults** and **Children > 5 years**: Pneumovax® II – single dose 0.5ml IM	Revaccination with Pneumovax® II is recommended every 5 years
Haemophilus type B (Hib) and Meningococcal group C conjugate (MenC)	**Children <10 years old:** **Previously unimmunised:** 3 doses of Diptheria/ Tetanus/ Pertussis (Acellular component)/ Poliomyelitis (Inactivated)/ Hib (Adsorbed) combined vaccine with 1 month interval between doses **Previously fully immunised:** Offer reinforcing dose 0.5ml IM of Hib/MenC (Menitorix®) **Adults and Children> 10 years:** **Previously unimmunised:** Two doses 0.5ml IM of Hib/MenC (Menitorix®) two months apart. **Previously fully immunised:** Offer reinforcing dose 0.5ml IM of Hib/MenC (Menitorix®)	Not currently recommended
Influenza	**Adults and Children**: Should receive yearly immunisation via their GP. Initial immunisation is warranted if the current influenza season has not finished (generally Sept to April).	Yearly- from Sept to Nov

OTHER MEASURES

It is essential to educate patients regarding the risk and the importance of prompt recognition and treatment of infections. Asplenic and hyposplenic patients should be encouraged to carry a card with information about their lack of a spleen, other clinical details, and contact telephone numbers. In an emergency this information may be life saving.

The following information should be given to patients who have undergone a splenectomy.

If you have had your spleen removed….

- You are more likely to get certain types of infection. These can sometimes develop very quickly. Early diagnosis and treatment are very effective and may be life-saving.
- Let your doctor know immediately if you develop a feverish illness. Inform your doctors and dentists that you have had your spleen removed. They may wish to give you antibiotics before surgical or dental procedures.
- Consult your doctor before going abroad or undertaking any unusual leisure pursuits.
- If you have an animal bite, even if it seems trivial, prophylactic antibiotics are required.

SPLENECTOMY CHECK LIST

1.Patient advised about the risks, symptoms and management of OPSI		
signed	Date	
2.Antibiotic prophylaxis discussed		
Decision to give	Yes / No	
Signed	Date	
Drug chosen	Dose	
Regime	Continuous/Rapid intervention	
3.Immunisation Indications and contraindications should be checked in current data sheets and in HMSO booklet *immunisation against Infectious Disease.*		
Pneumococcal vaccine discussed		
Decision to give	Yes / no	
Brand	Batch	Site(if given)
Signed	Date	
Booster 5 – 10 years		
Entered on practice recall system		
Signed	Date	
Haemophilus (Hib) / Meningococcal vaccine discussed		
Decision to give	Yes / no	
Brand	Batch	Site (if given)
Signed	Date	
Influenza vaccine		
Entered on practice recall system		
Signed	Date	
4.Patient given card to carry		
Signed	Date	

The above is to be completed by appropriate medical staff

APPENDIX 8: HIV Post Exposure Prophylaxis (PEP)

To be read in conjunction with MEHT Management of Blood Borne Viruses Policy 05105 (20th June 2012)

PEP should be recommended to health care workers if they have had a significant occupational exposure to blood or another high-risk body fluid (amniotic fluid, cerebrospinal fluid, exudative fluid from burns or lesions, breast milk, pericardial fluid, peritoneal fluid, pleural fluid, semen, synovial fluid, unfixed human tissues/organs, vaginal secretions) from a patient or other source either known to be HIV infected, or considered to be at high risk of HIV infection, but where the result of an HIV test has not or cannot be obtained, for whatever reason.

PEP should not be offered after exposure through any route with low-risk materials (e.g. urine, vomit, saliva, faeces) unless they are visibly bloodstained (e.g. saliva in association with dentistry). Also, PEP should not be offered where testing has shown that the source is HIV negative, or if risk assessment has concluded that HIV infection of the source is highly unlikely. Exceptionally, PEP may be indicated following a negative test if there is reason to suspect the source may be seroconverting (i.e. in the window period).

PEP is not a licensed indication for any of the antiretroviral drugs, which are therefore prescribed on an 'off-label' basis. Within MEHT, the following HIV PEP is recommended:

Truvada tablet (245mg tenofovir disoproxil (as fumarate) and 200mg emtricitabine (FTC))
ONE tablet ONCE a day

Plus

Raltegravir tablet (400mg)
ONE tablet TWICE a day

The content of the PEP pack has been updated following a change to the recommended regime by the Expert Advisory Group on AIDS (September 2014). Since nausea and diarrhoea are not as common with raltegravir, domperidone and loperamide are no longer included in the PEP pack. These need to be prescribed separately if required or alternatively loperamide can be purchased from a pharmacy.

PEP is most likely to be effective when initiated as soon as possible (within hours, and certainly within 48–72 hours of exposure), and continued for at least 28 days.

Pregnancy does not preclude the use of HIV PEP. **Expert advice should always be sought if PEP is considered indicated for a female health care worker who is pregnant**, after assessment of the circumstances of the exposure and of the source patient. Urgent pregnancy testing should be arranged for any female worker who cannot rule out the possibility of pregnancy.

HIV PEP kits may be obtained from Occupational Health or out of hours from A&E or the Emergency Drug Cupboard at Broomfield Hospital.

APPENDIX 9: Staphylococcal Decontamination

Please refer to MRSA Care Pathway (Appendix 9)

5 Day Staphylococcus decontamination regimen

Mupirocin 2% nasal ointment tds for 5 days

Plus

Octenisan skin cleanser daily body wash

Plus

Octenisan skin cleanser hair wash on Day 1, 3, and 5

APPENDIX 10: Care Pathway for MRSA Patients

Care Pathway for MRSA Patients

Mid Essex Hospital Services NHS
NHS Trust

Patient Name
Number
(fix Identity label)

Ward/Dept……

Date commence:……

Aims: Effective management of MRSA colonised patients. To prevent cross-infection to patient e.g. patient's I.V. devices or to other patients, and to maintain safe environemnt.								
Actions / Elements		Date ……	Date ……	Date ……	Date ……	Date ……	Date ……	Date ……
		Tick actions / elements performed or that is appropriate						
Section 1 -Triggers to MRSA pathway								
High Risk Groups	* Identify as MRSA +ve in the past							
	* From a Nursing/Residential home							
	* Has been in hospital in the last 6 mths							
	* Healthcare worker							
	* Patient is from abroad							
	* Immuno-compromised patient							
	* Patient on Renal dialysis							
	* Has long term invasive devices e.g. peg							
	* Have chronic skin breaks							
Nursed in High Risk areas-Burns, ITU, Burns Rehab, Plastic, Dialysis								
Dual MRSA swabs Taken								
MRSA Screen result positive (……)								
If result is **negative** please go to Section 6								
Section 2 - Antibiotic prescribing								
Review current antibiotic therapy - ensure any antibiotic used cover MRSA								
Section 3 -Isolation Nursing								
Inform patient of result.								
Give patient fact sheet and explain reason for isolation								
Nurse in side room ideally with en suite facilities								
Standard isolation sign on the door								
Section 4 - Decontamination protocol								
If MRSA positive - Bactroban for 10 days nasally TDS								
Use Octenisan for bath/shower (leave for 3 mins before rinsing off) and use disopsal wipes & clean towel every time -until discharge								
Clean Night clothes every night								
Clean bedding every day								
Section 5 - Environmental & Equipment decontamination								
Daily clean of room with Actichlor Plus esp. frequently touch points								
Decontamination of equipment daily- equipment should be patient specific) Use disinfectant wipes								
Terminal clean on discharge and curtain change								
Section 6 - MRSA screen negative for High Risk patients or in High risk areas								
If negative -continue care with Octenisan wash **without Bactroban**								
Section 7 -Comments if any elements/actions cannot be achieved								
Risk								
Risk assessment								

APPENDIX 11: Prophylaxis of Bacterial Endophthalmitis in Cataract Surgery

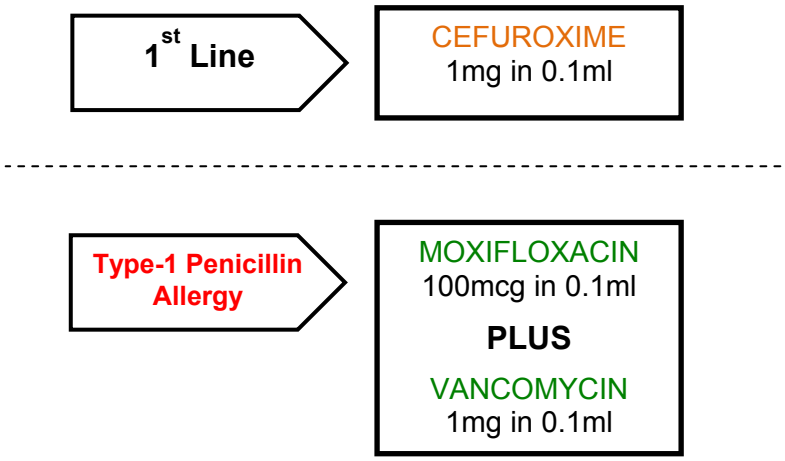
Background

Endophalmitis is a vision threatening condition caused by internal infection of the eye. Prophylactic measures for endophthalmitis are targeted against various sources of infection.

The prophylactic antibiotic is given by intracameral administration inside the anterior chamber of the eye at the time of surgery.

Antibiotic Prophylaxis

Cefuroxime is the only licensed product to use for intracameral administration and recommended as first line. If a patient has a type 1 allergic reaction to Penicillin or in any other special circumstances the surgeon may opt for second line option.



Cefuroxime (APROKAM) is available as 50mg vial. This needs to be reconstituted in 5ml of sodium chloride 0.9% injection to give 10mg in 1ml strength. The recommended dose is 1mg (0.1ml) of cefuroxime.

Vancomycin is available as a 3mg in 0.3ml Intravitreal pre-filled syringe. The recommended dose for intracameral use is 1mg in 0.1ml.

Moxifloxacin is only available as a buffered injection syringe from Moorfields Pharmaceutical (please contact pharmacy regarding availability).

Discharge Medication

On discharge, patients should be given;

CHLORAMPHENICOL EYE DROPS 0.5% QDS for 2 weeks

DEXAMETHASONE EYE DROPS 0.1% QDS for 4 weeks

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