Whittington Health NHS

Whittington Hospital NHS Trust

Use of Antimicrobials in Bacterial Infections in Adults - Guidelines for Management

Subject:	Use of Antimicrobials in Bacterial Infections
Policy Number	
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Version Control Sheet

Version	Date	Author	Status	Comment
3.0	26/06/12	Dr Michael Kelsey (Consultant Microbiologist), Dr Julie Andrews (Consultant Microbiologist), Ai-Nee Lim (Lead Pharmacist, Antimicrobials).	Inactive	▪ 7-day Stop/Review Policy amended to reflect the use of JAC electronic prescribing system. ▪ Ceftriaxone dose of epipidymo-orchitis and urethritis/cervicitis with gonorrhoea has been increased to 500mg IM stat to reflect the 2010 revised BASHH national guideline. ▪ Azithromycin 1g PO stat added to the treatment for gonorrhoea in urethritis/cervicitis as per the 2011 revised BASHH national guideline. ▪ Acute appendicitis added to the guideline. ▪ Neutropenic sepsis treatment regimen changed to single agent Piperacillin/tazobactam. For penicillin allergy, Ciprofloxacin plus Vancomycin. Gentamicin use no longer recommended as per NICE Guideline CG151 (2012).
3.1	09/09/14	Dr Michael Kelsey (Consultant Microbiologist), Dr Julie Andrews (Consultant Microbiologist), Ai-Nee Lim (Lead Pharmacist, Antimicrobials).	Active	• Ciprofloxacin currently 1st line chemoprophylaxis for meningococcal meningitis contacts to reflect HPA/PHE guidance. • Pneumocystis jirovecii (PCP) indication has been added to the guideline.
3.2	07/04/16	Dr Julie Andrews (Consultant Microbiologist), Ai-Nee Lim (Lead Pharmacist, Antimicrobials).		• Septicaemia includes options for non-severe and severe penicillin allergy • Co-amoxiclav dose for human bites increased to 625mg PO TDS • Flucloxacillin dose for cellulitis increased to 1g (or 2 g IV QDS for complicated and/or obese patient). • Levofloxacin included as a treatment option for Epididymo-orchitis and H. pylori in patients with severe penicillin allergy. • Epididymo-orchitis includes options for patients who are contra-indicated or intolerant to quinolone. • Benzylpenicillin dose for necrotising fasciitis increased to 1.2 – 2.4g IV 4 hourly. • Azithromycin added as a treatment option for urethritis & cervicitis in pregnant women. • Ceftriaxone is the first line for enteric fever. • CMV indication added.

Aim of guideline:

To guide clinical staff in the safe management and prescription of bacterial infections.

Abbreviations used in this guideline:

PO = oral, IV = intravenous, mg = milligram, kg = kilogram, G = gram, IBW = ideal body weight, PR = per rectal, CRP = C-reactive protein.

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General information:

1. Antimicrobial Guideline

- The purpose of this guideline is to provide guidance on empirical treatment of infections.
- The recommendation in this guideline is not exhaustive and does not purport to cover all clinical circumstances.
- This guideline should be used in conjunction with the separate antibiotic guidelines for specific areas (available on the intranet under Clinical Guidelines - Microbiology / Infection Control) and the British National Formulary (BNF).
- Please refer to separate source of advice on treatment choices for Ambulatory IV Antibiotic Therapy or Outpatient Parenteral Antibiotic Therapy (OPAT).
- The doses recommended in this guideline are based on adult patients with normal renal function. For advice on dosing in renal or hepatic impairment, please contact your ward pharmacist or Medicines Information.
- Contact microbiology for advice on clinical circumstance not covered in the guidelines or in cases where deviation from the guidelines is deemed necessary.

ANTIMICROBIAL THERAPY SHOULD BE STARTED AS SOON AS POSSIBLE ONCE BACTERIAL INFECTION IS SUSPECTED.
Cultures should ideally be collected from patients before antimicrobial therapy,
however collection of cultures should not delay the initiation of therapy in critically ill patients.
Do not wait until the next routine drug round before giving the initial dose. If necessary ensure a stat dose is given.

2. Antibiotic Formulary

- Below are antibiotics listed in the Whittington formulary (available on the intranet under Pharmacy Department).
- Consultant staff who want to prescribe an antibiotic that is not on the formulary should contact the Chief Pharmacist or Formulary Pharmacist to arrange for the request to be considered by the Drug and Therapeutic Committee (DTC).
- Antibiotics for general use are available for the routine treatment of infections.
- Restricted antibiotics should only be used following microbiology advice or according to an agreed guideline.
- Restricted antibiotics should not be held in main ward stocks and should only be issued on an individual patient basis. Microbiology approval is required for an exemption.

Antibiotics for general use

- Amoxicillin
- Benzypenicillin (Penicillin G)
- Cefalexin
- Clarithromycin
- Co-amoxiclav (amoxicillin / clavulanic acid)
- Doxycycline
- Ethambutol
- Flucloxacillin
- Gentamicin
- Isoniazid
- Metronidazole
- Nitrofurantoin
- Phenoxymethylpenicillin (Penicillin V)
- Pyrazinamide
- Rifampicin
- Rifinah® (rifampicin / isoniazid)
- Trimethroprim

Restricted antibiotics

- Amikacin
- Ceftazidime
- Ceftriaxone
- Chloramphenicol
- Ciprofloxacin
- Clindamycin
- Colistin
- Co-trimoxazole
- Ertapenem
- Erythromycin (*for Women's Health and Paediatric use only*)
- Fidaxomicin
- Fusidic acid (or Sodium fusidate)
- Linezolid
- Lymecycline (*for Dermatology use only*)
- Meropenem
- Minocycline (*Dermatology use only*)
- Moxifloxacin (*for Microbiology or Respiratory team use only*)
- Oxytetracycline (*reserved for 2nd line eradication of Helicobacter Pylori*)
- Pivmecillinam
- Spectinomycin (*for GUM clinic or ASHC use only*)
- Streptomycin (*for Microbiology or Respiratory team use only*)
- Tazocin® (piperacillin / tazobactam)
- Teicoplanin
- Tigecycline
- Vancomycin

3. Intravenous to oral antibiotics switch policy

Aim: To ensure that patients are given oral antibiotics where feasible to reduce morbidity and cost of treatment.
To ensure that all intravenous devices are removed at the earliest possible moment and thus reduce the risk of staphylococcal bacteraemia.

Indication for ORAL route	Indication for INTRAVENOUS route
• Clinical condition stable or improving • Antibiotic drug regimen available in oral form or oral therapy possible with altered regimen (if on intravenous antibiotics) • Patient able to take antibiotic in oral form	• Severe infection eg. organ failure • Antibiotic choice only available in parenteral form • Patient unable to take oral therapy: – Vomiting – Nil by mouth – Reduced absorption due to bowel disease – Reduced transit time (diarrhoea) – Reduced compliance in taking oral therapy • Specific indications e.g. endocarditis, osteomyelitis, neutropenia, prosthesis/implant/graft, septic arthritis.

- Monitor clinical conditions, if stable or improving, change to oral therapy.
- All prescriptions for intravenous antibiotics should be reviewed **three days** after treatment has commenced, with the view to switching them to oral at the earliest safe opportunity. Ward pharmacists will place a reminder note on the electronic drug chart to indicate when an IV antibiotic has been given for three days and is in need of review.
- Daily reports of 'Patients on IV Antibiotics' are available for clinical staff as a clinical support tool to highlight patients on IV antibiotics who required daily reviews if newly initiated or at least twice a week for long-term treatments ($>$ 1 month).
- Respond to investigations. Modify antibiotic therapy according to culture results.
- Do not assume that 1st generation oral cephalosporins are equivalent to 2nd and 3rd generation parenteral agents.
- Penicllin V is usually not suitable for patients switching from IV therapy since its absorption is unreliable.

4. Antimicrobial 7 (seven)–day Stop/Review Policy

Aim: To ensure that patients are not prescribed excessive courses of antimicrobials, and therefore prevent the emergence of antimicrobial resistance, reduce antimicrobial-associated diarrhoea, adverse effects and unnecessary costs.

The following information must be entered as a note on the electronic prescribing system by the prescriber:

1. Clinical indication for the prescribed antibiotic
2. Intended duration of treatment or review date

Where an antimicrobial agent has been given for more than **7 days** (total course including IV and oral), and neither the duration nor the stop date have been stated on the prescription, pharmacists will alert the attending doctor to review the prescription via a reminder note on the electronic prescribing system.

It is the responsibility of the attending doctor to review the antimicrobial therapy and consult Microbiology if a prolonged treatment course is deemed appropriate. The rational to extend the course of antimicrobial to more than 7 days and the intended duration of treatment must be clearly endorsed on the electronic prescribing system.

Inclusion criteria

All in-patient antimicrobial prescriptions will only be valid for a maximum of 7 days (total course including IV and oral).

Exclusion criteria

- If an approval for an exception to the 7-day antimicrobial stop policy has been granted by microbiology, AND the intended duration or review date has been explicitly documented in the electronic prescribing system.
- The antibiotic is prescribed for long-term prophylaxis.

5. Classification of 'penicillin allergy'

- **Immediate Type Reaction**: Urticaria, pruritis, angioedema, bronchospasm, facial swelling, hypotension, or arrhythmia
  Contra-indicated: All beta-lactam antibiotics including penicillins, cephalosporins, meropenem/imipenem and aztreonam.
- **Non-Immediate Type Reaction**: Delayed rash, nausea, vomiting
  Contra-indicated: All penicillins
  May be used with caution: Cephalosporins, meropenem/imipenem and aztreonam.

NB: Combination antimicrobials such as Augmentin® (co-amoxiclav) and Tazocin® (piperacillin/tazobactam) contain penicillin.

➢ *Upper respiratory tract infection:*

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Acute pharyngitis		Penicillin V **Or** **If proven Group A Streptococcus** Amoxicillin **<u>If penicillin allergy</u>** Clarithromycin	500 mg 6 hourly PO 500 mg 8 hourly PO 500 mg 12 hourly PO	7 – 10 days 7 – 10 days 7 – 10 days
Otitis media	Haemophilus influenzae, Streptococcus Group A Streptococcus pneumoniae Staphylococcus aureus Moraxella catarrhalis	Amoxicillin **<u>If penicillin allergy</u>** Clarithromycin	500 mg 8 hourly PO 500 mg 12 hourly PO	3 – 5 days 3 – 5 days
Chronic Suppurative Otitis Media	Therapy depends on results of cultures. Withhold therapy and review when cultures available. Do not use topical antibiotics.			

➢ *Lower respiratory tract infection:*

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
COPD – acute exacerbation	Haemophilus influenzae Streptococcus pneumoniae Moraxella catarrhalis	Amoxicillin **2nd line** Co-amoxiclav **If penicillin allergy** Doxycycline	500 mg 8 hourly PO 625 mg 8 hourly PO 200 mg on first day, then 100 mg daily PO	5 – 7 days 5 – 7 days 5 – 7 days
Community acquired pneumonia (CAP) – Low severity (CURB-65 score: 0 – 1)		Amoxicillin **Or** Clarithromycin	500mg 8 hourly PO 500mg 12 hourly PO	5 – 7 days 5 – 7 days see CAP guideline
Community acquired Pneumonia (CAP) – Moderate severity (CURB-65 score: 2)	Unknown organism	Benzylpenicillin **Plus** Clarithromycin **Or** Clarithromycin **Plus** **If non-severe penicillin allergy (e.g. rash)** Ceftriaxone	1.2 – 2.4 g 6 hourly IV 500 mg 12 hourly PO/IV 500mg 12 hourly PO/IV 2g once a day IV	7 – 10 days Switch to oral amoxicillin 500mg 8 hourly + clarithromycin 500mg 12 hourly after 72 hours 7 – 10 days Discuss with Microbiologist. see CAP guideline

		If severe penicilin allergy (anaphylaxis) Vancomycin	 1g 12 hourly IV‡ If elderly > 65 years: 500mg 12 hourly IV‡	
Community acquired Pneumonia (CAP) – High severity (CURB-65 score: 3 – 5)	Unknown organism Or Possible aspiration Or Not improving after 48 hours of benzylpenicillin	Co-amoxiclav **Plus** Clarithromycin **Or** Clarithromycin **Plus** **If non-severe penicillin allergy (e.g rash)** Ceftriaxone **If severe penicllin allergy (anaphylaxis)** Vancomycin	1.2 g 8 hourly IV 500 mg 12 hourly PO 500mg 12 hourly PO/IV 2g once a day IV 1g 12 hourly IV‡ If elderly > 65 years: 500mg 12 hourly IV‡	7 – 10 days Switch to oral co-amoxiclav 625mg 8hourly + clarithromycin 500mg 12hourly after 72 hours 7 – 10 days Discuss with Microbiologist. see CAP guideline
Pneumococcal pneumonia	Streptococcus pneumoniae	Benzylpenicillin **If penicillin allergy** Clarithromycin	1.2 – 2.4 g 6 hourly IV 500 mg 12 hourly PO/IV	7 – 10 days Switch to oral amoxicillin 500mg 8 hourly after 72 hours. see CAP guideline 7 – 10 days

H. influenzae pneumonia	Haemophilus influenzae	Co-amoxiclav **<u>If penicillin allergy</u>** Contact Microbiology	1.2 g 8 hourly IV	7 – 10 days Switch to oral co-amoxiclav 625mg 8 hourly after 72 hours
Legionellosis	Legionella pneumophila	Clarithromycin **With or without** Rifampicin	500 mg 12 hourly PO/IV 300 mg 12 hourly PO/IV	14 days see CAP guideline 14 days
Staphylococcal pneumonia	Staphylococcus aureus	Flucloxacillin **With or without** Gentamicin **<u>If penicillin allergy</u>** Contact Microbiology	1 g 6 hourly PO / IV 7 mg/kg* once daily IV	Discuss with Microbiologist. Duration may be prolonged. see CAP guideline
Hospital acquired pneumonia (HAP) – early onset (2 to 4 days of hospitalization)		Amoxicillin **Or** Clarithromycin	500 mg 8 hourly PO / IV 500 mg 12 hourly PO/IV	7 days Consider switching to oral regimen after 48 – 72 hours see HAP guideline
Hospital acquired pneumonia (HAP) – late onset (5 or more days of hospitalization) – Not recently ventilated and not on other augmented care	Unknown organism	Co-amoxiclav **<u>If penicillin allergy</u>** Ciprofloxacin **Plus** Vancomycin	1.2 g 8 hourly IV *or* 625 mg 8 hourly PO 400mg 12 hourly IV *or* 500mg 12 hourly PO 1g 12 hourly IV‡ <u>If elderly > 65 years:</u> 500mg 12 hourly IV‡	7 days Consider switching to oral regimen after 48 – 72 hours see HAP guideline

Hospital acquired pneumonia (HAP) – late onset (5 or more days of hospitalization) **AND** – on augmented care e.g. ventilated		Piperacillin/tazobactam **<u>If penicillin allergy</u>** Ciprofloxacin	4.5g 8 hourly IV 400mg 12 hourly IV *or* 750mg 12 hourly PO	7 days see HAP guideline
	Meticillin-resistant Staphylococcus aureus (MRSA)	Vancomycin	1g 12 hourly IV‡ <u>If elderly > 65 years:</u> 500mg 12 hourly IV‡	Discuss with Microbiologist. Duration may be prolonged.
Aspiration pneumonia **and / or** mediastinitis	Anaerobes Staphylococcus aureus Streptococcus pneumoniae	Co-amoxiclav **<u>If penicillin allergy</u>** Clindamycin	1.2 g 8 hourly IV or 625 mg 8 hourly PO/NG 600mg 6 hourly IV or 450mg 6 hourly PO	Review after 7 days. If X-ray changes consistent with aspiration pneumonia, treatment may need to be prolonged. Discuss with Microbiologist.

* For gentamicin, take levels 6 – 14 hours after the start of the infusion. Adjust dosing interval according to the Hartford Nomogram. Please refer to Guideline for Gentamicin Dosing in Adults.

‡ For vancomycin, take trough (pre-dose) levels immediately before giving the 3rd or 4th dose. Adjust dose according to levels. Please refer to Guideline for Glycopeptide Dosing in Adults.

➢ *Meningitis:*

For children/ neonates – see Paediatric Formulary and Clinical Guidelines

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Meningitis	Organism unknown	Ceftriaxone **<u>If severe penicillin allergy (anaphylaxis)</u>** Chloramphenicol	2 g 12 hourly IV 1g 6 hourly IV/PO	Discuss with Microbiologist
Meningococcal Meningitis	Neisseria meningitidis	Benzylpenicillin **<u>If penicillin allergy</u>** Chloramphenicol	1.2 g 4 hourly IV 1g 6 hourly IV/PO	5 – 10 days
Chemoprophylaxis is given to close contacts only. Close contacts are family members or persons sharing accommodation with the patient, kissing contacts, first-aiders giving mouth-to-mouth ventilation.	Neisseria meningitidis	Ciprofloxacin	500mg single dose PO	Single dose. Discuss with Microbiology and HPA. see Meningitis - Prophylaxis for Contacts

Haemophilus influenzae Meningitis	Haemophilus influenzae	Ceftriaxone **Or** Amoxicillin (if organism known to be sensitive) **<u>If severe penicillin allergy (anaphylaxis)</u>** Chloramphenicol	2 g 12 hourly IV 2 g 4 hourly IV 1g 6 hourly IV/PO	Until afebrile for 5 days. Total course is usually 10 – 14 days.
Chemoprophylaxis is given to all family contacts if one or more family member are < 4 yrs old or are vulnerable individuals of any age (immunosuppressed or asplenic).	Haemophilus influenzae	Rifampicin	600 mg daily PO	4 days. Discuss with Microbiology and HPA. see Meningitis - Prophylaxis for Contacts
Pneumococcal Meningitis	Streptococcus pneumoniae	Benzylpenicillin **Or** Ceftriaxone **<u>If severe penicillin allergy (anaphylaxis)</u>** Chloramphenicol	2.4 g 4 hourly IV 2 g 12 hourly IV 1g 6 hourly IV/PO	At least 14 days. Discuss with Microbiology.

➢ *Septicaemia / Abdominal Sepsis (gut associated):*

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Septicaemia/ Abdominal Sepsis (gut associated)		Co-amoxiclav **With or without** Gentamicin	1.2 g 8 hourly IV 7 mg/kg* once a day IV	Discuss with microbiologist. see Sepsis Care Pathway
		If non-severe penicillin allergy (delayed rash) Ceftriaxone **With or without** Gentamicin	 2 g once a day IV 7 mg/kg* once a day IV	
		If severe penicillin allergy Clindamycin **Plus** Gentamicin	 600 mg 6 hourly IV 7 mg/kg* once a day IV	

* For gentamicin, take levels 6 – 14 hours after the start of the infusion. Adjust dosing interval according to the Hartford Nomogram. Please refer to Guideline for Gentamicin Dosing in Adults.

➢ *Tuberculosis (TB):*

NB: Treatment has to be supervised by a physician experienced in the treatment of TB.

Management Guidance (see Tuberculosis Treatment and Chemoprophylaxis - Guideline)

- Check baseline Liver Function Tests and CRP.
- Combination products aid compliance.
- To monitor compliance Rifampicin can be detected on urine samples to Microbiology department.

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Tuberculosis	Mycobacterium tuberculosis Standard treatment for pulmonary disease is quadruple therapy	*Under 50kg* Rifinah 150 (= rifampicin 150mg + isoniazid 100mg)	3 tablets once a day PO	For 6 months
		Over 50kg Rifinah 300 (= rifampicin 300mg + isoniazid 150mg)	2 tablets once a day PO	
		Plus Pyrazinamide	*Under 50kg* = 1.5g daily PO *Over 50kg* = 2g daily PO	For first 2 months
		Plus Ethambutol	15mg/kg once a day PO	For first 2 months

➢ *Urinary Tract Infections:*

Management Guidance (see Urology Antimicrobial Guideline)

- Therapy should be modified according to culture result.
- Elderly patients over the age of 65 years of age with asymptomatic bacteriuria do not require antibiotic treatment.
- Antibiotic treatment is not recommended for patients with positive catheter specimen of urine (CSU) culture who are asymptomatic.

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Uncomplicated infections/ outpatients	Escherichia coli Staph. saprophyticus	Trimethoprim **Or** Amoxicillin **Or** Nitrofurantoin **Or** Cefalexin (reserved for use in pregnancy)	200 mg 12 hourly PO 500 mg 8 hourly PO 50 mg 6 hourly PO 500 mg 12 hourly PO	3 days for women or 7 days for men 7 days.
Complicated infections: e.g. upper urinary tract involvement	Enterobacteriaceae	Co-amoxiclav **With or without** Gentamicin **<u>If non-severe penicillin allergy (e.g. rash)</u>** Ceftriaxone	1.2 g 8 hourly IV or 625 mg 8 hourly PO 7 mg/kg * once daily IV 2 g once a day IV	7 – 10 days Contact Microbiology 7 – 10 days

* For gentamicin, take levels 6 – 14 hours after the start of the infusion. Adjust dosing interval according to the Hartford Nomogram. Please refer to Gentamicin Adult Dosing guideline.

		<u>If severe penicillin allergy (anaphylaxis)</u> Ciprofloxacin	500 mg 12 hourly PO	7 – 10 days
Epididymo-orchitis *(if possibly caused by sexually transmitted pathogen)*	Neisseria gonorrhoeae Chlamydia trachomatis	Ceftriaxone **Plus** Doxycycline **<u>If severe penicillin allergy (anaphylaxis) or tetracycline allergy</u>** Levofloxacin	500 mg single dose IM 100 mg 12 hourly PO 500 mg once a day PO	stat 10 – 14 days 10 days
Epididymo-orchitis *(if possibly caused by negative enteric organisms due to recent instrumentation, catheterisation or anatomical abnormalities of the urinary tract system)*	Gram negative enteric organisms	Ciprofloxacin **With or without** Gentamicin (if patients present with septicaemia) **<u>If quinolone contraindicated or intolerance</u>** Co-amoxiclav **With or without** Gentamicin (if patients present with septicaemia)	500 mg 12 hourly PO 7 mg/kg* single dose IV 1.2 g 8 hourly IV 7 mg/kg* single dose IV	14 days and review stat 14 days and review Switch to co-amoxiclav 625mg PO 8 hourly if clinically appropriate stat

Prostatitis	Gram negative enteric organisms Enterococci Staph. aureus	**1st line** Ciprofloxacin	500 mg 12 hourly PO	28 days
		With or without Gentamicin (if patients present with septicaemia)	7 mg/kg* single dose IV	Stat
		2nd line Trimethoprim	200 mg 12 hourly PO	28 days

* For gentamicin, take levels 6 – 14 hours after the start of the infusion. Adjust dosing interval according to the Hartford Nomogram. Please refer to Gentamicin Adult Dosing guideline.

➢ *Soft Tissue Infections:*

Management Guidance

- Oral versus IV therapy depends on presentation of patient. If local inflammation without systemic symptoms or pyrexia present, oral therapy might suffice
- If extensive cellulitis or severe local inflammation is present with or without pyrexia, IV therapy is generally preferable
- If patient is admitted to hospital for IV therapy, take blood cultures, take swabs, check baseline FBC, ESR, CRP and mark area of inflammation to monitor therapy effect.
- Therapy should be modified according to culture result.

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Soft tissue infection -mild/moderate cellulitis		Flucloxacillin **<u>If penicillin allergy</u>** Clarithromycin	500 mg – 1 g 6 hourly PO 250 – 500 mg 12 hourly PO	Discuss with Microbiologist
Soft tissue infection -severe cellulitis	Staphylococcus aureus (meticillin sensitive) Group A Streptococcus	Flucloxacillin **Plus** Benzylpenicillin **<u>If penicillin allergy</u>** Clindamycin	1 g 6 hourly IV (or 2g 6 hourly in complicated and/or obese patients) 1.2 g 6 hourly IV 450 mg 6 hourly PO or 600 mg 6 hourly IV	Discuss with Microbiologist Switch to oral regimen once stable: Flucloxacillin 500mg to 1g 6 hourly PO + Amoxicillin 500mg 8 hourly PO.

	Invasive meticillin-resistant Staphylococcus aureus (MRSA)	Vancomycin	1g 12 hourly IV‡ If elderly > 65 years: 500mg 12 hourly IV‡	Discuss with Microbiologist.
Necrotising fasciitis, gas gangrene, synergistic gangrene		Benzylpenicillin **Plus** Clindamycin **Plus** Gentamicin	1.2 – 2.4 g 4 hourly IV 900 mg – 1.2 g 6 hourly IV 7 mg/kg* once daily IV	Discuss all cases with Microbiology
Animal and Human bites		Co-amoxiclav **If penicillin allergy** Metronidazole **Plus** Clarithromycin (human) **Or** Doxycycline (animal)	625 mg 8 hourly PO 400mg 8 hourly PO 500 mg 12 hourly PO 200 mg on first day, then 100 mg daily PO	5 days 5 days 5 days 5 days
Chronic ulcers *(increased discharge, oedema and inflammation)*		Co-amoxiclav **If penicillin allergy** Clindamycin	625 mg 8 hourly PO 300 – 450 mg 6 hourly PO	Discuss with Microbiologist. see Diabetic Foot Ulcer Guideline

* For gentamicin, take levels 6 – 14 hours after the start of the infusion. Adjust dosing interval according to the Hartford Nomogram. Please refer to Guideline for Gentamicin Dosing in Adults.

‡ For vancomycin, take trough (pre-dose) levels immediately before giving the 3rd or 4th dose. Adjust dose according to levels. Please refer to Guideline for Glycopeptide Dosing in Adults.

➢ *Bone and Joint Infections:*

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Septic arthritis		Flucloxacillin **Plus** Benzylpenicillin	1g 6 hourly IV/PO 1.2g 6 hourly IV	2 – 6 weeks of IV therapy followed by 3 – 12 weeks of oral regimen. Switch benzylpenicillin IV to oral amoxicillin 500mg 8 hourly.
		<u>If penicillin allergy</u> Clindamycin	 600mg 6 hourly IV or 450mg 6 hourly PO	 Discuss with Microbiologist
Osteomyelitis		Contact Microbiology		

➢ *Eye Infection:*

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Eye infection in adults		Chloramphenicol 1% eye ointment	6 to 8 hourly	For 5 days

➢ *Genital Infections:*

Management Guidance:

- All sexually transmitted diseases should be referred to the Sexual Health Clinic for further investigations and partner tracing.

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Urethritis & cervicitis	Chlamydia trachomatis	Doxycycline	100 mg 12 hourly PO	7 days
		<u>If pregnant</u>		
		Azithromycin	1 g single dose PO	7 days
		Or		
		Erythromycin	500 mg 6 hourly PO or 500 mg 12 hourly PO	14 days
	N. gonorrhoeae	Ceftriaxone	500 mg single dose IM	stat
		Plus		
		Azithromycin	1 g single dose PO	stat
		<u>If severe penicillin allergy (anaphylaxis)</u>		Non urethral/cervical cases contact St Ann's Sexual Health Clinic or Microbiology
		Spectinomycin	2 g single dose IM	
		Plus		
		Azithromycin	1 g single dose PO	
	Trichomonas vaginalis	Metronidazole	2 g stat PO	Single dose
			Or	
			400 mg 12 hourly PO	5 – 7 days

Pelvic inflammatory disease (outpatients) Increasing prevalence of quinolone resistant gonococcal. Avoid using quinolone in patients with high risk of gonococcal infection (e.g. partner has gonorrhoea, clinically severe disease, following sexual contact abroad). Discuss with Microbiologist.	N.gonorrhoeae C. trachomatis or "Non-specific"	Ceftriaxone **Plus** Doxycycline **Plus** Metronidazole **<u>If severe penicillin allergy (anaphylaxis)</u>** Levofloxacin **Plus** Metronidazole	500mg single dose IM 100 mg 12 hourly PO 400mg 12 hourly PO 500 mg once daily PO 400 mg 12 hourly PO	stat 14 days 14 days 14 days 14 days
Pelvic inflammatory disease (inpatients)		Ceftriaxone **Plus** Doxycycline **<u>If severe penicillin allergy (anaphylaxis)</u>** Clindamycin **Plus** Gentamicin	2 g once a day IV 100 mg 12 hourly PO 900 mg 8 hourly IV 7 mg/kg* once daily IV	Continue until 24 hours after clinical improvement. Then switch to oral Doxycycline 100mg BD PLUS Metronidazole 400mg BD to complete 14 days of treatment. Continue until 24 hours after clinical improvement. Then switch to oral Clindamycin 450 mg QDS to complete 14 days of treatment.

* For gentamicin, take levels 6 – 14 hours after the start of the infusion. Adjust dosing interval according to the Hartford Nomogram. Please refer to Guideline for Gentamicin Dosing in Adults.

➢ *Gastrointestinal Infections:*

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Gastroenteritis	*Campylobacter* spp.	Clarithromycin **Or** Ciprofloxacin	250 mg 12 hourly PO 500 mg 12 hourly PO	5-7 days 5 days Usually self-limiting.
Clostridium difficile associated diarrhea (CDAD)	*Clostridium difficile*	**<u>Mild / moderate disease</u>** Metronidazole	400 mg 8 hourly PO	10 – 14 days
		<u>Severe disease</u> Metronidazole **Plus** Vancomycin	500 mg 8 hourly IV 500mg 6 hourly PO	10 – 14 days 10 – 14 days
		<u>Life threatening disease</u> Metronidazole **Plus** Vancomycin **plus** Human immunoglobulin[§]	500 mg 8 hourly IV 500 mg 6 hourly PO 400 mg/kg iv stat.	10 – 14 days 10 – 14 days Repeat at 21 days if necessary. <u>see CDAD guideline</u>

[§] For human immunoglobulin, consult microbiology before prescribing. Please register patient on the IVIg database via Haematology.

Eradication of Helicobacter pylori • **FIRST LINE**	*Helicobacter pylori*	Lansoprazole **Plus** Amoxicillin **Plus** Clarithromycin	30 mg 12 hourly PO 1 g 12 hourly PO 500 mg 12 hourly PO	7 days 7 days 7 days
		Or (**if previous exposure to clarithromycin)** Lansoprazole **Plus** Amoxicillin **Plus** Metronidazole	 30 mg 12 hourly PO 1 g 12 hourly PO 400mg 12 hourly PO	 7 days 7 days 7 days
		<u>If penicillin allergy</u> Lansoprazole **Plus** Metronidazole **Plus** Clarithromycin	 30 mg 12 hourly PO 400 mg 12 hourly PO 250 mg 12 hourly PO	 7 days 7 days 7 days
		Or (if previous exposure to clarithromycin):		

		Lansoprazole **Plus** Bismuth chelate **Plus** Metronidazole **Plus** Tetracycline	30 mg 12 hourly PO 240 mg 12 hourly PO 400 mg 12 hourly PO 500 mg 12 hourly PO	7 days 7 days 7 days 7 days see Helicobacter pylori guideline
Eradication of Helicobacter pylori • **FAILED ON 1ST LINE TREATMENT**	*Helicobacter pylori*	Lansoprazole **Plus** Amoxicillin	30 mg 12 hourly PO 1 g 12 hourly PO	7 days 7 days
		Plus *(whichever NOT used as first-line therapy):* Clarithromycin **Or** Metronidazole	 500 mg 12 hourly PO 400 mg 12 hourly PO	 7 days 7 days
		<u>If previous exposure to clarithromycin AND metronidazole</u> Lansoprazole **Plus** Amoxicillin	 30 mg 12 hourly PO 1 g 12 hourly PO	 7 days 7 days
		Plus *(depending on contraindications / previous exposure to a quinolone):* Tetracycline **Or** Levofloxacin	 500mg 6 hourly PO 250mg 12 hourly PO	 7 days 7 days

	<u>If penicillin allergy</u>		
	Lansoprazole	30 mg 12 hourly PO	7 days
	Plus		
	Metronidazole	400 mg 12 hourly PO	7 days
	Plus		
	Levofloxacin	250 mg 12 hourly PO	7 days
	Or (if previous exposure to a quinolone):		
	Lansoprazole	30 mg 12 hourly PO	7 days
	Plus		
	Bismuth chelate	120 mg 6 hourly PO	7 days
	Plus		
	Metronidazole	400 mg 8 hourly PO	7 days
	Plus		
	Tetracycline	500 mg 6 hourly PO	7 days
			see Helicobacter pylori guideline

Enteric fever	*Salmonella typhi* *Salmonella paratyphi* A & B	Ceftriaxone	2 g once a day IV	Discuss with Microbiology NB: Ciprofloxacin must not be used as a first-line treatment for typhoid fever in patients travelling from South Asia or other regions with high rates of fluoroquinolone resistance unless sensitivities known.
		If penicillin allergy (Discuss with Microbiology):		
		Ciprofloxacin	400 mg 12 hourly IV / 500 mg 12 hourly PO	
		Or		
		Chloramphenicol	500 mg 6 hourly PO	
		Or		
		Azithromycin	500 mg once a day PO	
Ascending cholangitis or Acute cholecystitis or Acute diverticulitis or Acute appendicitis *(only if evidence of perforation e.g. necrotic appendix and free turbid fluid/pus)*		Co-amoxiclav	1.2 g 8 hourly IV *or* 625 mg 8 hourly PO	7 – 10 days Consider switching to oral regimen after 48 – 72 hours see Gastroenterology Antimicrobial Guideline
		<u>If penicillin allergy</u>		
		Initiate on intravenous regime:		
		Clindamycin	300–600 mg 6 hourly IV *or* 450 mg 6 hourly PO	
		Plus		
		Gentamicin	7 mg/kg* once daily IV	
		Switch to oral regime when clinically indicated:		
		Ciprofloxacin	500 mg 12 hourly PO	
		Plus		
		Metronidazole	400 mg 8 hourly PO	

* For gentamicin, take levels 6 – 14 hours after the start of the infusion. Adjust dosing interval according to the Hartford Nomogram. Please refer to Guideline for Gentamicin Dosing in Adults.

➢ *Neutropenic Sepsis (adult regimen):*

Management Guidance

- Entry site infection will not respond to antibiotic therapy and line will need to be removed.

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Initial pyrexial episode or other presentation in keeping with neutropenic sepsis	Central venous catheter line infection not suspected	Piperacillin/tazobactam **<u>If penicillin allergy</u>** Ciprofloxacin **Plus** Vancomycin	4.5 g 6 hourly IV 400 mg 12 hourly IV 1 g 12 hourly IV‡	Review within 24 hours. If patient do no response, discuss with Microbiology. see Neutropenic Sepsis guideline
	Central venous catheter line infection suspected	Vancomycin (in addition to the above)	1 g 12 hourly IV‡ <u>For elderly > 65 years:</u> 500mg 12 hourly IV‡	

‡ For vancomycin, take trough (pre-dose) levels immediately before giving the 3rd or 4th dose. Adjust dose according to levels. Please refer to Guideline for Glycopeptide Dosing in Adults.

➢ *Opportunistic infections*

Diagnosis	Infective organism	Antibiotic	Dose/Frequency/Route	Duration/Comments
Pnemocystis pneumonia (PCP)	*Pnemocystis jirovecii*			
• **Moderate to Severe** ($PaO_2 \leq 9.3$ kPa or $SpO_2 < 92\%$)		**1st line** Co-trimoxazole	30 mg/kg 6 hourly IV for 3 days. Then reduce to 30 mg/kg 8 hourly IV/PO for a further 18 days. *(NB. Use actual body weight and round up to nearest 96mg/ml.)*	21 days. (Caution use in G6PD deficiency.)
		Plus Prednisolone	40 mg 12 hourly PO for 5 days, then 40 mg once a day PO for 5 days, then 20 mg once a day for 11 days. **If oral or enteral route not available:** Methylprednisolone IV at 75% of the respective prednisolone dose as above.	Commence corticosteroid at the same time as anti-PCP therapy (or at least no later than 72 hours after starting anti-PCP therapy.)

CONTINUE (see above) • **Moderate to Severe** ($PaO_2 \leq 9.3$ kPa or $SpO_2 < 92\%$)	**<u>2nd line</u>** Clindamycin **Plus** Primaquine **Plus** Prednisolone	600 mg 6 hourly IV *or* 450 mg 6 hourly PO 15-30 mg once a day PO 40 mg 12 hourly PO for 5 days, then 40 mg once a day PO for 5 days, then 20 mg once a day for 11 days. **If oral or enteral route not available:** Methylprednisolone IV at 75% of the respective prednisolone dose as above.	21 days 21 days.(Caution use in G6PD deficiency.) Commence corticosteroid at the same time as anti-PCP therapy (or at least no later than 72 hours after starting anti-PCP therapy.)
	<u>3rd line</u> Pentamidine isetionate **Plus** Prednisolone	4 mg/kg once a day IV *(NB. If obese i.e. > 15% over Ideal Body Weight (IBW), dose according to IBW and round up to nearest 60mg/ml.)* 40 mg 12 hourly PO for	21 days Commence corticosteroid at the

		5 days, then 40 mg once a day PO for 5 days, then 20 mg once a day for 11 days. **If oral or enteral route not available:** Methylprednisolone IV at 75% of the respective prednisolone dose as above.	same time as anti-PCP therapy (or at least no later than 72 hours after starting anti-PCP therapy.)
Pnemocystis pneumonia *Pnemocystis jirovecii* (PCP)			
• **Mild to Moderate** (PaO_2 > 9.3 kPa)	**1st line** Co-trimoxazole	30 mg/kg 8 hourly PO *(NB. Use actual body weight and round up to nearest 240mg)*	21 days. (Caution use in G6PD deficiency.)
	2nd line Trimethoprim **Plus** Dapsone	5 mg/kg 6 hourly PO *(NB. Use actual body weight and round up to nearest 50mg.)* 10 mg once a day PO	21 days.
	3rd line Atovaquone	750 mg 12 hourly PO with food	21 days.

Cytomegalovirus (CMV) **retinitis**	**1st line**		
	Valganciclovir	900 mg 12 hourly PO for 2 – 4 weeks THEN reduce to 900 mg once a day PO	Until immune reconstitution is achieved
	2nd line		
	Ganciclovir	5 mg/kg 12 hourly IV for 2 – 4 weeks THEN reduce to 5 mg/kg once a day PO (or 6 mg/kg/day for 5 days of the week)	Until immune reconstitution is achieved
	3rd line		
	Foscarnet	90 mg/kg 12 hourly IV for 2 – 4 weeks THEN reduce to 90 mg/kg once a day (or 120 mg/kg/day for 5 days of the week)	Until immune reconstitution is achieved
	4th line		
	Cidofovir	5 mg/kg once a week IV for 2 weeks THEN reduce to 5 mg/kg every 2 weeks IV	Until immune reconstitution is achieved
Cytomegalovirus (CMV) **pneumonitis**	**1st line**		
	Ganciclovir	5 mg/kg 12 hourly IV	21 days. Consider valganciclovir 900 mg 12 hourly PO if able to tolerate oral therapy/ IV to PO switch

	2nd line (not responsive or intolerant to Ganciclovir		clinically indicated.
	Foscarnet	90 mg/kg 12 hourly IV	21 days.
	Or		
	Cidofovir	5 mg/kg once a week IV	21 days.
Cytomegalovirus (CMV) **colitis**	**1st line**	5 mg/kg 12 hourly IV	14 – 28 days
	Ganciclovir		Switching to oral valganciclovir may be considered if symptoms are not severe enough to prevent oral absorption.
	2nd line		
	Foscarnet	90 mg/kg 12 hourly IV	
Cytomegalovirus (CMV) **encephalitis**	**1st line**		
	Ganciclovir	5 mg/kg 12 hourly IV for 3 weeks THEN reduce to 5 mg/kg once a day IV (or switch to valganciclovir 900 mg once a day PO).	Discuss with Microbiology.
	2nd line		
	Foscarnet	90 mg/kg 12 hourly IV for 2 weeks THEN reduce to 90 mg/kg once a day.	
	3rd line		
	Cidofovir	5 mg/kg once a week IV for 2 weeks THEN reduce to 5 mg/kg every 2 weeks.	

➢ Sources of immediate help

During working hours

SpR in Microbiology - *Monday to Friday, 09:00 – 17:00*	ext. 5085 / 5780 or bleep 3069
Dr Kelsey (Consultant Microbiologist) - *Monday to Friday, 09:00 – 17:00*	ext. 5082
Dr Julie Andrews (Consultant Microbiologist) - *Monday to Friday, 09:00 – 17:00*	ext. 3894
Lead Pharmacist, Antimicrobials - *Monday to Friday, 09:00 – 17:30*	ext. 3644 or bleep 3138
Medicines Information - *Monday to Friday, 09:00 – 17:30*	ext. 5021
Archway Sexual Health Clinic (ASHC)	020 7530 5814

Out of hours

On-call SpR in Microbiology	aircall via Whittington switchboard
On-call pharmacist	aircall via Whittington switchboard

To be completed and attached to any procedural document when submitted to the appropriate committee for consideration and approval

		Yes/No	Comments
1.	**Does the procedural document affect one group less or more favourably than another on the basis of:**		
	Race	No	
	Ethnic origins (including gypsies and travellers)	No	
	Nationality	No	
	Gender	No	
	Culture	No	
	Religion or belief	No	
	Sexual orientation including lesbian, gay and bisexual people	No	
	Age	No	
	Disability - learning disabilities, physical disability, sensory impairment and mental health problems	No	
2.	**Is there any evidence that some groups are affected differently?**	No	
3.	**If you have identified potential discrimination, are any exceptions valid, legal and/or justifiable?**	No	
4.	**Is the impact of the procedural document likely to be negative?**	No	
5.	**If so can the impact be avoided?**	N/A	
6.	**What alternatives are there to achieving the procedural document without the impact?**	N/A	
7.	**Can we reduce the impact by taking different action?**	N/A	

If you have identified a potential discriminatory impact of this procedural document, please refer it to the Director of Human Resources, together with any suggestions as to the action required to avoid/reduce this impact.

For advice in respect of answering the above questions, please contact the Director of Human Resources.

Checklist for the Review and Approval of Procedural Document

To be completed and attached to any procedural document when submitted to the relevant committee for consideration and approval.

	Title of document being reviewed:	Yes/No	Comments
1.	**Title**		
	Is the title clear and unambiguous?	Yes	
	Is it clear whether the document is a guideline, policy, protocol or standard?	Yes	
2.	**Rationale**		
	Are reasons for development of the document stated?	Yes	
3.	**Development Process**		
	Is it clear that the relevant people/groups have been involved in the development of the document?	Yes	
	Are people involved in the development?	Yes	
	Is there evidence of consultation with stakeholders and users?	Yes	
4.	**Content**		
	Is the objective of the document clear?	Yes	
	Is the target population clear and unambiguous?	Yes	
	Are the intended outcomes described?	Yes	
5.	**Evidence Base**		
	Are key references cited in full?	N/A	
	Are supporting documents referenced?	N/A	
6.	**Approval**		
	Does the document identify which committee/ group will approve it?	Yes	
7.	**Dissemination and Implementation**		
	Is there an outline/plan to identify how this will be done?	Yes	
8.	**Document Control**		
	Does the document identify where it will be held?	Yes	
9.	**Process to Monitor Compliance and Effectiveness**		
	Are there measurable standards or KPIs to support the monitoring of compliance with and effectiveness of the document?	Yes	
	Is there a plan to review or audit compliance with the document?	Yes	

10.	**Review Date**		
	Is the review date identified?	Yes	
	Is the frequency of review identified? If so is it acceptable?	Yes	
11.	**Overall Responsibility for the Document**		
	Is it clear who will be responsible for co-ordinating the dissemination, implementation and review of the document?	Yes	

Executive Sponsor Approval			
If you approve the document, please sign and date it and forward to the author. Procedural documents will not be forwarded for ratification without Executive Sponsor Approval			
Name		Date	
Signature			
Relevant Committee Approval			
The Director of Nursing and Patient Experience's signature below confirms that this procedural document was ratified by the appropriate Governance Committee.			
Name		Date	
Signature			
Responsible Committee Approval – only applies to reviewed procedural documents with minor changes			
The Committee Chair's signature below confirms that this procedural document was ratified by the responsible Committee			
Name		Date	
Name of Committee		Name & role of Committee Chair	
Signature			

Tool to Develop Monitoring Arrangements for Policies and guidelines

What key element(s) need(s) monitoring as per local approved policy or guidance?	Who will lead on this aspect of monitoring? Name the lead and what is the role of the multidisciplinary team or others if any.	What tool will be used to monitor/check/observe/Assess/ inspect/ authenticate that everything is working according to this key element from the approved policy?	How often is the need to monitor each element? How often is the need complete a report ? How often is the need to share the report?	What committee will the completed report go to?
Element to be monitored	**Lead**	**Tool**	**Frequency**	**Reporting arrangements**
Appropriate use of antibiotics according to guideline	**Lead Antimicrobial Pharmacist with support from Microbiology and Pharmacy**	**JAC electronic prescribing report.**	**Refer to antibacterial audit programme.**	**Infection Prevention and Control Committee (IPCC)**