ADULT ANTIMICROBIAL GUIDE

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1 WHAT'S NEW IN THIS VERSION?

Welcome to the ELHT Antimicrobial Formulary!

It is hoped that this tool will help promote the safe, effective and economic use of antibiotics across ELHT, minimise the emergence of bacterial resistance and provide more accesible & support for prescribers across the Trust.

V1.1 Changelog.

1. Some images throughout the guide were not displaying in V1.0 - issue resolved.
2. Updates to missing content throughout guide.

Please get in touch with with your feedback & comments.

2 PIPERACILLIN - TAZABACTAM RESTRICTION INFORMATION

Pipericillin-Tazobactam (Tazocin) â€“ Restricted

There is a national shortage of **Piperacillin-Tazobactam - all strengths.** This shortage is likely to affect the Trust for a period of *months* not weeks.

The use of Piperacillin-tazobactam is restricted for:

- **Critical Care**
- **Patients with neutropenic sepsis**

For all other indications where Piperacillin-tazobactam is normally first line treatment

The option for **â€œpenicillin allergy â€“ anaphylaxisâ€ •** must be used in the appropriate section of the guidelines. These guidelines must be adhered to.

Any exceptions must be approved by a Microbiologist.

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Any queries can be directed to pharmacy or your ward pharmacist

Antimicrobial Pharmacist

Microbiologist

Out of hours, a Microbiologist can be contacted via switchboard.

3 SECONDARY CARE EMPIRICAL GUIDELINES

3.1 ACKNOWLEDGEMENTS

Acknowledgements & Disclaimer

Document authored by:

Acknowledgement:

ELHT Hospitals NHS Trust Antimicrobial Formulary:

The primary objective of this Formulary is to ensure appropriate selection of antimicrobials for treatment of common infections. The choice of antimicrobials in the Formulary has been carefully selected to move to agents with a lower risk of precipitating Healthcare Associated Infections, including MRSA, Clostridium difficile and ESBLs.

These guidelines are evidence based and reflect nationally agreed practice. They specify the recommended antimicrobial, dose, route and duration of treatment for common infections encountered in secondary care.

The doses mentioned in this formulary are for adults with normal renal and hepatic function. Please speak to your ward pharmacist or contact Pharmacy Medicines Information for advice on dosing in renal or hepatic impairment.

There are separate guidelines for the use of antibiotics in paediatrics (age 1 month â€“ 18 years) and neonates (age birth - 28 days). These should be referred to when prescribing antibiotics for these age groups in conjunction with BNFc.

Any deviation in this formulary from national guidance is due to local culture and sensitivity data.

3.2 USEFUL TOOLS

3.2.1 ADVICE ON ANTIBIOTIC ALLERGIES

Antibiotic Allergies

The Trust views drug allergy as a serious patient safety issue.

For all patients reporting an adverse reaction to an antibiotic (or any drug), the nature of this should be documented in the Drug Intolerance section on the front of the prescription chart **OR** on ePMA **AND** on the Alert Sheet in patients medical notes.

Patients commonly report adverse reactions to antibiotics, especially the penicillin group. It is therefore very important to clarify the nature of the adverse reaction.

Patients often report to being â€œallergicâ€• to an antibiotic, when in fact they experienced a common adverse drug reaction (e.g. diarrhoea or vomiting) rather than an allergic reaction (e.g. rash, angioedema or anaphylaxis). In these cases the benefits of using a penicillin-based regimen probably outweigh the risks.

Crossover allergy

Patients with a true allergy to penicillins should be thought to be allergic to all penicillins.

The risk of crossover allergy is reported as 10% for cephalosporins, though review of published evidence suggests a much lower chance of crossover allergy. Crossover has also been reported with carbapenems (e.g. meropenem, ertapenem), approximately 8-11%.

It is important to document whether cephalosporins have been given without adverse effects in â€œpenicillin â€“allergicâ€• patients for future reference.

Penicillin and beta-lactam antibiotics

Prescribers commonly forget that the following are penicillin antibiotics, and as a consequence they are sometimes prescribed **inappropriately** in patients with a penicillin allergy:

AugmentinÂ® (Co-amoxiclav)
TazocinÂ® (Piperacillin with tazobactam)

Selexid (Pivmecillinam)

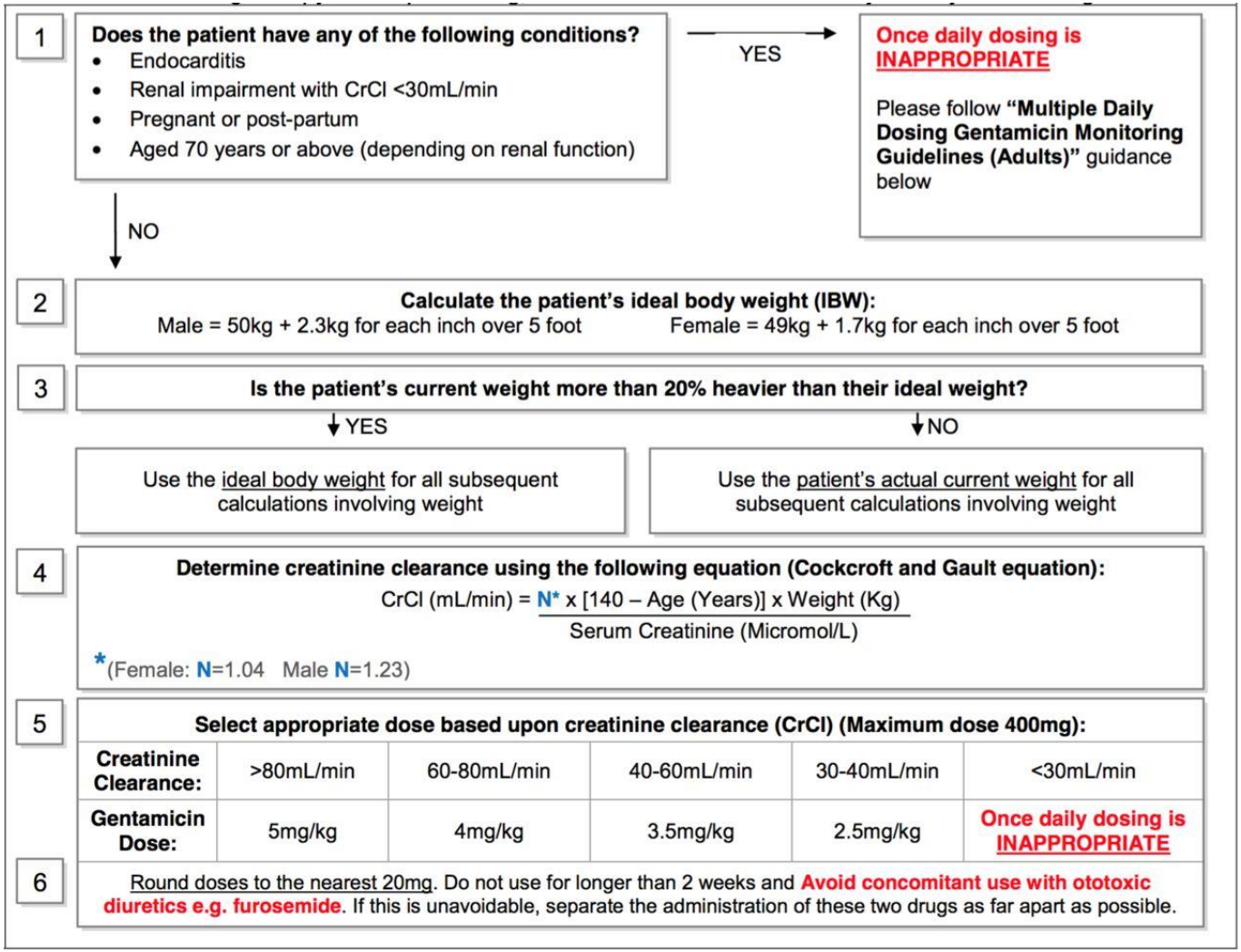
3.2.2 GENTAMICIN DOSING & MONITORING

3.2.2.1 GENTAMICIN DOSING & MONITORING

Once Daily Gentamicin Monitoring Guidelines (Adults)

FOR FURTHER ADVICE CONTACT CONSULTANT MICROBIOLOGIST OR A PHARMACIST

Gentamicin is a potentially toxic drug, particularly in the elderly and in renal impairment. Serum levels must be monitored to ensure that safe and effective blood concentrations are achieved during therapy. WHEN PRESCRIBING, BEAR IN MIND THAT A STAT DOSE MAY ALREADY HAVE BEEN GIVEN IN THE ED.



Administration Instructions

Dilute with 100mL sodium chloride 0.9% or glucose 5% and give by IV infusion over 30 to 60 minutes.

What must be monitored? **(not required for stat doses)**	**Pre-dose (trough)** gentamicin blood concentration 20 to 24 hours after the first dose and thereafter as below. Unless renally impaired do not wait for the result before giving the next dose. Results must be reviewed before the third dose can be given Post-dose (peak) levels are NOT required. Monitor renal, auditory and vestibular function and document in notes (baseline and during therapy)
When do I repeat blood assay? (take samples 19-20 hours after dosing)	Repeat every 3-4 days if renal function remains stable. Recheck daily if dose adjustments have been made. If renally impaired, check daily.
Target assay levels	**Pre-dose level (trough) <1.0mg/L**
Recommendations for dose adjustment	**Normal pre-dose level**: - Continue current regimen - Repeat pre-dose levels after 3-4 days if renal function remains stable **Pre-dose level 1-2mg/L (and renal function unchanged)**: - Reduce dose and keep dose interval at 24 hours. Repeat pre-dose levels before next dose **Pre-dose level >2mg/L**: - Further gentamicin doses should be withheld until discussed with Microbiology - The need for gentamicin therapy should be reviewed

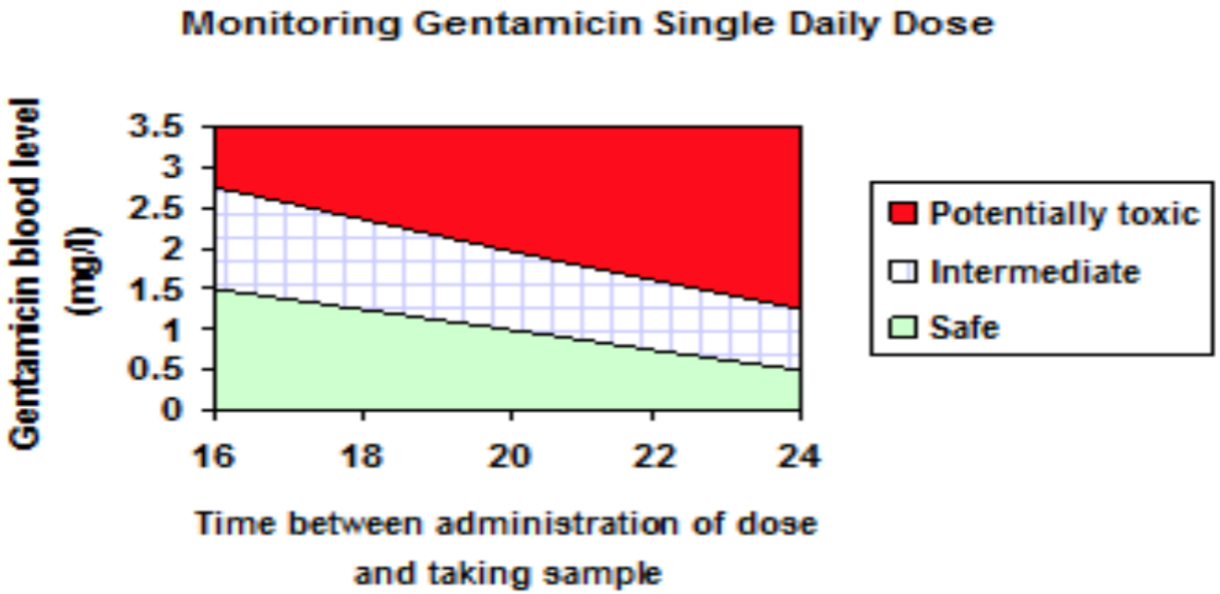
Monitoring

THIS GRAPH CAN BE USED AS AN ALTERNATIVE TOOL FOR ASSESSING THE SAFETY OF GENTAMICIN BLOOD LEVELS WITH ONCE DAILY DOSING.

X-axis denotes the hours elapsed since last dose prior to sampling.

Safe (stable renal function) - Continue without dose adjustment

Intermediate or toxic: Contact a pharmacist or consultant microbiologist for advice



Introduction	For patients where once daily gentamicin is inappropriate. - Endocarditis - Ascites - Renal impairment CrCl <30mL/min - Pregnancy and post-partum - Patients aged 70 years and above (depending on renal function)
Dose regimen	Normal renal function 1mg/kg 12-hourly CrCl 30-70mL/min 80mg 12-hourly (60mg if <60kg) CrCl 10-30mL/min 80mg 24-hourly (60mg if <60kg) CrCl 5-10mL/min 80mg 48-hourly (60mg if <60kg)
Administration	Dilute with 100mL sodium chloride 0.9% or glucose 5% and give by IV infusion over 30 to 60 minutes.
What must be monitored?	**Pre-dose (trough)** blood gentamicin concentration Pre-dose level must be low to minimise toxicity **One-hour post-dose (peak)** blood gentamicin concentration Post-dose level must be adequate to ensure efficacy Monitor renal, auditory and vestibular function and document in notes (baseline and during therapy)

When should I monitor?

Check around the 3rd or 4th dose - (If renally impaired, check around the 2nd dose)

Thereafter check levels twice weekly - (If renally impaired, contact Microbiologist/Pharmacist for advice)

Target assay levels

Pre-dose level <1mg/L for endocarditis

Post-dose level 3-5mg/L for streptococcal or enterococcal infections e.g. endocarditis

Recommendations for dose adjustment

Normal pre-dose

- *Regimen can be continued*
- *Further pre-dose levels should be monitored twice weekly so long as renal function is stable*

Pre-dose level is between 2-3mg/L (and renal function is unchanged)

- *Increase the dosing interval e.g. from TDS to BD*

Pre-dose level is >3mg/L

- *Further gentamicin doses should be witheld*
- *Discuss with Microbiology before recommencing therapy*

Post-dose level is below the target range

- *Gentamicin is subtherapeutic*
- *The dose should be increased*

Post-dose level is above the target range; pre-dose level is normal

- *Reduce the dose*

Both the post-dose and pre-dose levels are above the target range

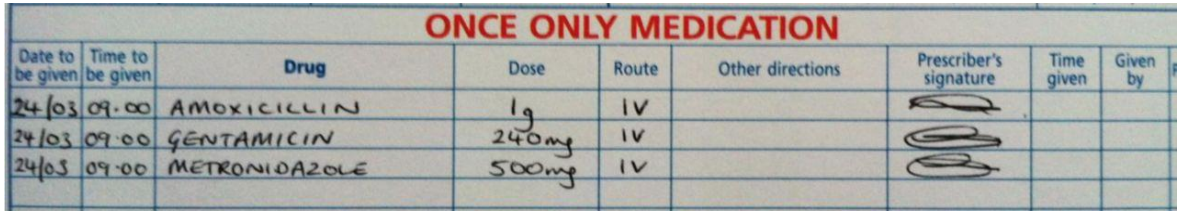
- The next dose should be omitted - Discuss with Microbiology before recommencing therapy

3.2.3 PRESCRIBING FIRST DOSE OF IV ABX - GUIDANCE

Guidelines for the prescribing of first dose intravenous antibiotics

To ensure timely and effective administration of intravenous antibiotics to patients the following principles should be adhered to:

- The initial prescription for an intravenous antibiotic should be written on the ONCE ONLY section of the drug chart (see below) OR a single dose prescribed on ePMA.



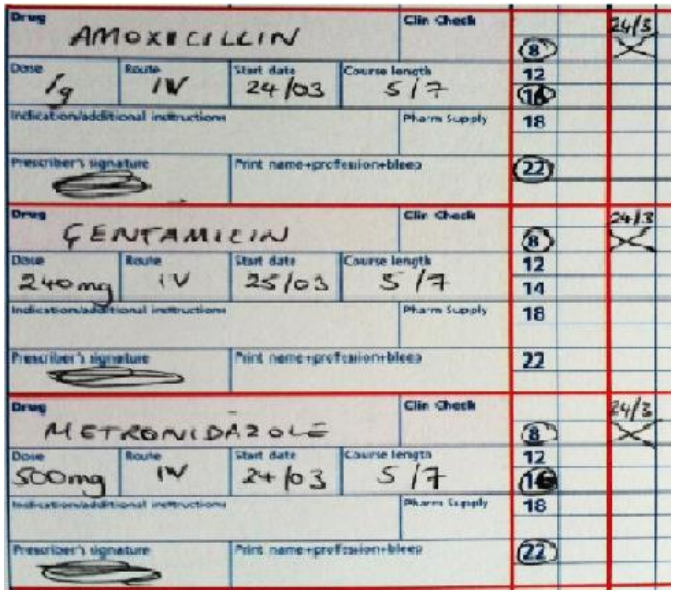
ONCE ONLY MEDICATION

Date to be given	Time to be given	Drug	Dose	Route	Other directions	Prescriber's signature	Time given	Given by
24/03	09·00	AMOXICILLIN	1g	IV				
24/03	09·00	GENTAMICIN	240mg	IV				
24/03	09·00	METRONIDAZOLE	500mg	IV				

- Subsequent doses should be written inside the drug chart as per normal prescribing guidance.

TAKE CARE WHEN PRESCRIBING HIGH RISK ANTIBIOTICS - e.g. GENTAMICIN

- Ensure that annotations are made to the drug chart in order to reduce the risk of Gentamicin being administered twice in 24 hours (see below)



Responsibilities of PRESCRIBERS

- **ENSURE** once only doses are prescribed for initiation of antibiotics
- **INFORM** nursing staff that a prescription has been written and requires administration
- **ENSURE** the patient had adequate IV access for administration
- **REPORT** incidents that delay administration of first dose intravenous antibiotics

Responsibility of NURSING STAFF

- **ENSURE** antibiotics are administered within ONE HOUR of a prescription being written
- **ENSURE** first doses of intravenous antibiotics are administered prior to ward transfer
- **ENSURE** that patients receive non ward stocked antibiotics overnight by utilising stock from the emergency cupboard or failing this contacting the on-call pharmacist
- **REPORT** incidents that delay administration of first dose intravenous antibiotics

Responsiblities of PHARMACY STAFF

- ENSURE that antibiotics are available in a timely manner to ensure that the first dose can be administered within ONE HOUR of prescribing
- ENSURE individual ward stock lists and levels are appropriate
- REPORT incidents that delay administration of first dose intravenous antibiotics

3.2.4 PRINCIPLES OF GOOD ANTIMICROBIAL PRESCRIBING

Principles of Antimicrobial Prescribing

1. Antimicrobials must only be prescribed where there are good clinical indications.
2. Every effort must be made to collect relevant specimens for microbiological investigations prior to starting antimicrobial therapy.
3. The indication and choice of antimicrobial agent(s) must be clearly documented in the medical notes. The indication for antibiotic treatment should also be documented on the prescription chart. All prescriptions should be written clearly.
4. The anticipated course length or review date must be clearly documented on the prescription chart and in the medical notes at the time of prescribing.
5. Antimicrobial therapy must be prescribed according to the ELHT Formulary which is informed by local pathogen epidemiology and local antimicrobial sensitivity patterns.
6. Antimicrobial therapy must be prescribed at an appropriate dose and frequency.
7. Restrict the use of broad spectrum antimicrobials to the empiric treatment of serious infections when the pathogen is not known, or when other effective agents are unavailable, or patient has

known allergies.

8. Narrow spectrum antimicrobials must be prescribed in preference to broad spectrum antimicrobials where possible in conjunction with Microbiology results.
9. Empiric antimicrobial prescriptions must be reviewed no later than 48 hours (automatic stop at 5 days) to consider switching to narrow spectrum agents.
10. Review ALL antimicrobials DAILY.
11. The oral route must be used in preference to the intravenous route wherever possible.
12. Intravenous therapy must be reviewed within 48 hours and switched to oral therapy if appropriate.
13. Antimicrobials with a high risk of precipitating Clostridium difficile infection (e.g. cephalosporins and quinolones) must be used with caution.
14. Do NOT prescribe antimicrobials from the restricted list without Consultant Microbiologist approval and document this in the medical notes.
15. Expert advice must be sought from a Consultant Microbiologist for complicated infections, interpretation of culture and sensitivity results or failure of empiric treatment.

3.2.5 START SMART, THEN FOCUS

Start Smart then FOCUS

ELHT NHS Trust endorses the **"Start Smart, Then Focus" principles advanced by the Department of Health Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection (ARHAI) in 2011:**

Start Smart:

- 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 treatment
- Document in medical notes: clinical indication, duration or review date, route and dose
- Obtain cultures first
- Prescribe single doses for surgical prophylaxis; where antibiotics shown to be effective

Then Focus:

Review the clinical diagnosis and the continuing need for antibiotics by 48 hours and make a clear plan of action - the "**Antimicrobial Prescribing Decision**" which must be clearly documented.

It is essential that the review and subsequent decision is clearly documented in the medical notes**.**

The **five Antimicrobial Prescribing Decision options** are:

1. **Stop** antibiotics if there is no evidence of infection
2. **Switch** antibiotics from IV to oral
3. **Change** antibiotics – ideally to a narrower spectrum, or broader if required
4. **Continue** and review again at 72 hours
5. Outpatient Parenteral Antibiotic Therapy **(OPAT)**

3.2.6 RESTRICTED ANTIBIOTIC LIST

Restricted Antibiotic List

To help reduce development of resistance to antimicrobial agents, the Trust has designated some â€˜restricted drugsâ€™.

The Pharmacy Service will NOT supply antimicrobials from the restricted list unless prescribed for a formulary indication or there is documented evidence of Consultant Microbiologist approval in the medical notes and/or prescription chart.

Restricted Antimicrobials

These antimicrobials may only be prescribed and supplied after approval from a Consultant Microbiologist-unless prescribed for specific infections listed within these guidelines. Pharmacists are required to confirm Microbiology approval or formulary indication before dispensing restricted antimicrobials.

Restricted antimicrobials are:

AMIKACIN
AMPHOTERICIN B (FUNGIZONEÂ® AND LIPOSOMAL)

ANIDULAFUNGIN^

AZTREONAM
CEFTAZIDIME
CHLORAMPHENICOL IV/PO^

Fidaxomicin
FLUCYTOSINE

Fosfomycin IV

LINEZOLID
LEVOFLOXACIN^

MEROPENEM^
MICAFUNGIN
NALIDIXIC ACID

PIPERACILLIN
AND TAZOBACTAM^

SODIUM FUSIDATE IV

TOBRAMYCIN

TIGECYCLINE

CEFUROXIME

ERTAPENEM

^may be prescribed for specific infections listed within the guidelines, or for patients on critical care without prior approval from a Consultant Microbiologist.

3.2.7 CHANGE TO ORAL GUIDELINE (CHORAL)

CHORAL (CHange to ORAL) Recommendations

Purpose

To provide guidance for the rational conversion of patients from parenteral antibiotic therapy to oral after 48 hours wherever possible.

Rationale

To reduce the risk of complications associated with parenteral antibiotic use:

- Morbidity associated with IV access (super-infection, extravasation, thrombophlebitis)
- Delayed discharge from hospital
- Increased nursing time
- Increased expenditure
- Increased adverse effects

Guideline

For most infections and most patients, intravenous antibiotic therapy can be converted to oral 24-48 hours after the start of treatment, as long as the following criteria are met:

- The infection is no longer life-threatening or able to cause major disability
- Patient must be haemodynamically stable
- Temperature and other signs of infection appear to be returning to normal
- It is recommended that the following inclusion criteria are checked before a decision is taken:
    - i. Signs and symptoms of infection are resolving
    - ii. Oral fluids are well tolerated
    - iii. There is a functioning GI tract, with no signs of malabsorption
    - iv. Oral formulation to be used has adequate and reliable absorption profile

Patients presenting with any of the following should **NOT** be converted to oral antibiotics early:

- Ongoing/potential GI absorption problems (vomiting, GI surgery or ileus)
- Immunocompromised patients
- Patients suffering from **severe** infections e.g.
    - Bone and joint infections
    - Peritonitis
    - Spreading cellulitis
    - Osteomyelitis
    - Lymphadenopathy and high fever
    - Septicaemia
    - Endocarditis
    - Septic arthritis
    - Encephalitis
    - Severe pneumonia
    - Febrile neutropenia
    - Meningitis
    - Staphylococcal bacteraemia
    - Infective gangrene

N.B. in **ALL** these cases **extended** or **complete courses** of parenteral antibiotics should be used.

3.3 CHANGE TO ORAL ANTIBIOTICS GUIDELINE (CHORAL)

This list is NOT exhaustive, but shows the step down oral therapy for commonly prescribed intravenous antibiotics. Where a dose range is stated, the dose should be selected based on the severity and site of infection.

Intravenous antibiotic	**Oral antibiotic and dose**
Amoxicillin	Amoxicillin 500mg to 1g 8 hourly
Benzylpenicillin	Phenoxymethylpenicillin 500mg 6 hourly
Co-amoxiclav	Co-amoxiclav 375 to 625mg 8 hourly
Ciprofloxacin	Ciprofloxacin 500mg 12 hourly (750mg 12 hourly if Pseudomonas spp isolated)
Clindamycin	Clindamycin 450mg 6 hourly
Clarithromycin	Clarithromycin 500mg 12 hourly
Flucloxacillin	Flucloxacillin 500mg to 1g 6 hourly
Gentamicin	Discuss with Microbiology
Linezolid	Linezolid 600mg 12 hourly
Metronidazole	Metronidazole 400mg 8 hourly
Meropenem	Discuss with Microbiology
Piperacillin + Tazobactam	Co-amoxiclav 625mg 8 hourly
Teicoplanin	Discuss with Microbiologist

Antimicrobial Formulary 2008: Secondary care guidelines for management of infections in adults

3.3.1 AUDIT STANDARDS FOR PRESCRIBING OF ANTIBIOTICS IN SECONDARY CARE

No.	Standard	Target	Exceptions
1	The diagnosis or likely diagnosis of an infection for which the patient is being treated with antibiotics is recorded	100%	Unstable patient with signs of infection (pyrexia, raised WCC etc)
2	Samples for microbiological culture are taken before starting antimicrobial therapy	100%	Patient refused consent
3	Allergies must be considered when prescribing antibiotics	100%	none
4	Metronidazole must not be prescribed with Co-amoxiclav	100%	none
5	Start and finish date for course of antibiotics must be recorded in the designated place on the prescription chart	100%	none
6	A course of antibiotics should be no more than 5 days	100%	Exceptions in table 1
7	IV therapy should be switched to oral therapy after 48 hours	100%	Exceptions in table 2
8	Restricted List Antibiotics can only be prescribed as per Consultant Microbiologist advice (see table 3)	100%	Tobramicin, Amikacin - at Consultant Paediatrician advice Ciprofloxacin – Consultant Urologist/Respiratory Physician advice Piperacillin + Tazobactam, Meropenem, Chloramphenicol for specific conditions listed with the guidelines or for patients on critical care

3.3.2

A rolling programme of audit will be used to monitor the effectiveness of the antimicrobial guidelines, as will surveillance of local resistance patterns.

Table 1 Exceptions to Standard 6 (greater than 5 days therapy with antibiotic)

Cavitating pneumonia	Liver abscess
Chlamydia	Mediastinitis
Complicated UTI	Meningitis
Empyema	Necrotising soft tissue infections
Endocarditis	Neutropenic sepsis
Exacerbations of cystic fybrosis	Osteomyelitis
Herpes simplex encephalitis	Pelvic inflammatory disease
Herpes simplex sores	
Inadequately drained abscesses	Septic arthritis
Infected implants / prosthetics	Staphylococcus aureus bacteraemia
Intracranial abscess	Suspected (or previously treated) non severe or atypical pnemonias
Intractable oral candiadisis	

Table 2 **Exceptions to Standard 7 (IV therapy should be switched to oral therapy after 48 hours)**

Oral route compromised	**High risk infections need prolonged IV therapy**
No suitable oral formulation	Staphylococcus aureus bacteraemia
Severe diarrhoea/vomiting	Necrotising soft tissue infections
Unable to swallow (eg Unconscious)	Neutropenic sepsis
No clinical improvement, e.g.	Infected implants / prosthetics
	Meningitis
SIRs i.e. TWO or more of:	Intracranial abscess
Temperature >38ºC or <36ºC	Mediastinitis
Heart rate >90 beats per minute	Endocarditis
Respiratory rate > 20 breaths per minute or $PaCO_2$ < 4.3kPa	Exacerbations of cystic fybrosis
WBC > 12 x 10^9 cells/mL or < 4 x 10^9 cells/mL	Inadequately drained abscesses and emphysema
For deep-seated infections an initial two weeks of therapy may be needed. Eg	
Liver abscess	Cavitating pneumonia
Osteomyelitis	Empyema
Septic arthritis	

Table 3 Standard 8: Antimicrobials restricted to use only when approved by Consultant Microbiologist, with documentation of approval in medical notes

Restricted List Antimicrobials
Amikacin* Amphotericin B (Fungizone® and Liposomal) Aztreonam Ciprofloxacin^ Ceftazidime Co-Amoxiclav^ Chloramphenicol IV/PO^ Flucytosine Linezolid Meropenem^ Micafungin Nalidixic acid Piperacillin + Tazobactam^ Sodium fusidate IV Tobramycin* Tigecycline Cefuroxime Ertapenem
*may be initiated by Consultant Paediatrician ^ may be prescribed for specific infections listed within the guidelines, or for patients on critical care without prior approval from a Consultant microbiologist

3.3.3 VANCOMYCIN DOSING & MONITORING

Vancomycin Monitoring Guidlines - ADULTS ONLY - NOT FOR ITU USE

FOR PATIENT SPECIFIC ADVICE CONTACT MICROBIOLOGY OR A PHARMACIST

Instructions for prescribing.

1. Prescribe a **LOADING DOSE** based on patients ACTUAL WEIGHT (see table below)

Weight	Loading Dose	Fluid Volume (Sodium Chloride 0.9% or Glucose 5%)	Infusion Time
Less than 60kg	1g	250ml	120 minutes
60-90kg	1.5g	500ml	180 minutes
Greater than 90kg	2g	500ml	210 minutes

PATIENTS ON RENAL REPLACEMENT THERAPY	1g	250ml	120 minutes

2. Calculate the **MAINTENANCE DOSE** based on patients creatinine clearance.

Prescribe the maintenance dose to start after the dosing interval suggested below

CrCl ml/min	Dose	Frequency	Dilution in 0.9% sodium chloride	Infuse over	Time initial trough level to be taken
>110	1.5g	12 hourly	500ml	180 minutes	Before 4th dose
90-110	1.25g	12 hourly	250ml	150 minutes	Before 4th dose
75-89	1g	12 hourly	250ml	120 minutes	Before 4th dose
55-74	750mg	12 hourly	250ml	120 minutes	Before 4th dose
40-54	500mg	12 hourly	250ml	60 minutes	Before 4th dose

30-39	750mg	24 hourly	250ml	120 minutes	Before 3rd dose
20-29	500mg	24 hourly	250ml	60 minutes	Before 3rd dose
â‰¤20	*Give a loading dose based on actual body weight as detailed above.* *Check a level 24 hours later.* *Only re-dose when the level is <15mg/L* *All subsequent doses should be:* *â€¢ <50Kg 750mg in 250ml 0.9% sodium chloride over 90 minutes* *â€¢ 50-70Kg 1g in 250ml 0.9% sodium chloride over 120 minutes* *â€¢ >70Kg 1.25g in 250ml 0.9% sodium chloride over 150 minutes*				Check level at 24 hours and only redo if <15mg/L
Patients on renal replacement therapy	Dialysis patients should receive an initial loading dose of 1g vancomycin. Re-dose with further STAT doses of vancomycin 1g ONLY when the level is reported to be <15mg/L Always communicate any prescriptions with the patients dialysis unit				Check level every 24 hours until <15mg/L

3. MONITORING

See chart above for timing of initial monitoring of trough levels.

Aim for trough levels of 15-20mg/L - If the level is reported in range countinue at the same dose and dosing frequency.

Recheck the levels every 3-7 days.

Doses should NOT be omitted whilst awaiting reporting of levels from the laboratory unless specifically requested by a doctor or pharmacist.

If Vancomycin levels are out of range follow the table below.

Trough level (pre-dose)	Dose adjustment â€“ USE IN CONJUNCTION WITH ABOVE CHART
Greater than 30mg/L	**OMIT** next dose and consult microbiologist and ward pharmacist immediately
25-30mg/L	**OMIT** next dose and move down **TWO** levels on above chart
20-25 mg/L	Move down **ONE** level on a above chart
15-20mg/L	Continue on current dose
10-15mg/L	Move up **ONE** level
5-10mg/L	Move up **TWO** levels
<5mg/L	Contact pharmacy for advice on redosing

3.4 BODY SYSTEMS

3.4.1 GASTROINTESTINAL SYSTEM

3.4.1.1 HELICOBACTER PYLORI

3.4.1.1.1 FIRST LINE TREATMENT

Helicobacter pylori - First line treatment

3.4.1.1.2 MICROBIOLOGICAL SPECIMENS

- Stool antigen test for Helicobacter pylori

NB

Maintenance PPI regimens as indicated by Gastroenterologist

Antibiotic - 1st Line

Lansoprazole 30mg orally BD

PLUS

Amoxicillin 1g orally BD

PLUS

Clarithromycin 500mg orally BD

Total duration of therapy 7 days

Penicillin allergy

Lansoprazole 30mg orally BD

PLUS

Clarithromycin 500mg orally BD

PLUS

Metronidazole 400mg orally BD

Total duration of therapy 7 days

3.4.1.1.3 SECOND LINE TREATMENT

Helicobacter pylori - Second line treatment

For use in patients who still have symptoms after first-line eradication treatment

Lansoprazole 30mg orally BD

PLUS

Amoxicillin 1g orally BD

PLUS

Clarithromycin 500mg orally BD **OR Metronidazole** 400mg BD (whichever was not used first line)

Total duration of therapy 7 days

Patients who have had previous exposure to Clarithromycin and Metronidazole

Lansoprazole 30mg orally BD

PLUS

Amoxicillin 1g orally BD

PLUS

Levofloxacin 250mg orally BD

Penicillin allergy

Lansoprazole 30mg orally BD

PLUS

Metronidazole 400mg orally BD

PLUS

Levofloxacin 250mg orally BD

Total duration of therapy 7 days

3.4.1.2 INTRA-ABDOMINAL SEPSIS

Intra-abdominal sepsis

Microbiological specimens

- Blood culture
- Peritoneal Swab

Antibiotic - 1st Line

Amoxicillin 1g IV 8 hourly

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin
(See â€œGentamicin Dosing and Monitoringâ€ • section of the formulary in "Useful Tools" for dose calculation/ monitoring)

Oral step down refer to sensitivities

If no sensitivities available:

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy 5 days

Amoxicillin and Metronidazole does NOT provide sufficient Gram negative cover and should NOT be used as an oral switch option for intra-abdominal sepsis - without an agent with broader Gram negative cover.

2nd Line or penicillin allergy

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin

(See â€œOnce daily gentamicin monitoringâ€• section of the formulary for dose calculation/ monitoring)

Oral step down refer to sensitivities

If no sensitivities available:

Trimethoprim 200mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

OR (in more severe cases)

Ciprofloxacin 500mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

Total duration of therapy 5 days

3.4.1.3 ACUTE DIVERTICULITIS

Acute Diverticulitis

Microbiological specimens

- Blood culture

Antibiotic - 1st Line

Amoxicillin 1g IV 8 hourly

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin
(See â€œGentamicin Dosing and Monitoringâ€• section of the formulary in "Useful Tools" for dose calculation/ monitoring)

Oral step down refer to sensitivities

If no sensitivities available:

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy 5 days

Amoxicillin and Metronidazole does NOT provide sufficient Gram negative cover and should NOT be used as an oral switch option for acute diverticulitis - without an agent with broader Gram negative cover.

2nd Line or penicillin allergy

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin

(See â€œOnce daily gentamicin monitoringâ€• section of the formulary for dose calculation/ monitoring)

Oral step down refer to sensitivities

If no sensitivities available:

Trimethoprim 200mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

OR (in more severe cases)

Ciprofloxacin 500mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

Total duration of therapy 5 days

3.4.1.4 ACUTE NON-INFLAMMATORY DIARRHOEA

Acute Non-Inflammatory Diarrhoea

Common Pathogens

Toxigenic E.Coli
Rotavirus
Norovirus
Enteric adenovirus
Astrovirus

NB:

Notify Infection Control immediately Ext 84639 Mainstay of treatment is fluid replacement

Antibiotics

NO antibiotics indicated

3.4.1.5 CLOSTRIDIUM DIFFICILE

3.4.1.5.1 MILD

Clostridium Difficile Infection (CDI)

ACID SUPPRESSING MEDICATIONS SHOULD BE REVIEWED IN ALL PATIENTS WITH CLOSTRIDIUM DIFFICILE AND WHERE APPROPRIATE STOPPED

Microbiological specimens

- Acute diarrhoea (Bristol stool chart 5-7): Stool sample which take the shape of container must be sent ASAP for C.difficile toxin test.

MILD Disease

Defined as:

< 3 loose stools of type 5-7 on the Bristol Stool Chart per day

Normal WBCs. No features of severe disease.

Review signs and symptons DAILY

Antibiotic - 1st Line

Stop all antibiotics - If this is not possible discuss with microbiologist

Stopping antibiotics alone may be sufficient.

If patient remains symptomatic:

Metronidazole 400mg orally 8 hourly

ONLY use Metronidazole 500mg IV 8 hourly if Nil-By-Mouth

Total duration of therapy 10 days

3.4.1.5.2 MODERATE

Clostridium Difficile infection (CDI)

ACID SUPPRESSING MEDICATIONS SHOULD BE REVIEWED IN ALL PATIENTS WITH CLOSTRIDIUM DIFFICILE AND WHERE APPROPRIATE STOPPED

Microbiological specimens

- Acute diarrhoea (Bristol stool chart 5-7): Stool sample which take the shape of container must be sent ASAP for C.difficile toxin testing.

MODERATE Disease

Defined as:

3-5 loose stools of type 5-7 on the Bristol Stool Chart per day.

WBCs <15 x 10^9 cells/L. No features of severe disease.

Review signs and symptoms DAILY

Antibiotics - 1st Line

Stop all antibiotics - if this is NOT possible discuss with microbiologist.

Metronidazole 400mg orally 8 hourly

ONLY use **Metronidazole** 500mg IV 8 hourly if Nil-By-Mouth

Total duration of therapy 10 days

3.4.1.5.3 SEVERE

Clostridium Difficile infection (CDI)

ACID SUPPRESSING MEDICATIONS SHOULD BE REVIEWED IN ALL PATIENTS WITH CLOSTRIDIUM DIFFICILE AND WHERE APPROPRIATE STOPPED

Microbiological specimens

- Acute diarrhoea (Bristol stool chart 5-7): Stool sample which take the shape of container must be sent ASAP for C.difficile toxin testing. Take Blood Culture if systemically unwell.

SEVERE Disease

Defined as:

Critically ill (features include):

- WBC > 15 x10^9 cells/L
- Temperature > 38.5^{o}C
- Acute increase in serum creatinine (>50% above baseline)
- Evidence of severe colitis
- Number of stools may be a less reliable indicator of severity

NB:

Urgent surgical review required if - failure to respond to **6** days treatment, critically ill, or have impending ileus, colonic dilatation or fulminant pseudomembraneous colitis.

Measure LACTATE in ALL patients with severe Clostridium difficile.

Fidaxomicin is a further option - prescribing MUST ONLY BE UNDER THE ADVICE OF A CONSULTANT MICROBIOLOGIST / C DIFF MDT

*Contact the Consultant Microbiologist regarding all severe cases

Antibiotics - 1st Line

Stop all antibiotics - if this is NOT possible discuss with microbiologist.

Vancomycin 125mg ORALLY 6 hourly

PLUS

Metronidazole 500mg IV 8 hourly

Total duration of therapy 10 days

Doses of up to 500mg Vancomycin can be used **BUT** must be under microbiologist advice **ONLY**

3.4.1.5.4 LIFE THREATENING

Clostridium Difficile infection (CDI)

ACID SUPPRESSING MEDICATIONS SHOULD BE REVIEWED IN ALL PATIENTS WITH CLOSTRIDIUM DIFFICILE AND WHERE APPROPRIATE STOPPED

Microbiological specimens

- Acute diarrhoea (Bristol stool chart 5-7): Stool sample which take the shape of container must be sent ASAP for C.difficile toxin testing. Take Blood Culture.

LIFE THREATENING Disease

Critically ill (features include)

- WBCs <15 x 10^9 cells/L. No features of severe disease.
- Temperature > 38.5^0 C
- Acute increase in serum creatinine (>50% above baseline)
- Evidence of severe colitis
- Number of stools maybe a less reliable indicator of severity

PLUS

- Hypotension

AND

- Partial/complete ileus

OR

- Toxic megacolon

OR

- CT evidence of severe disease

NB:

Fidaxomicin /IV immunoglobulin are further options - prescribing of these **MUST ONLY BE UNDER THE ADVICE OF A MICROBIOLOGIST/C DIFF MDT**

Measure LACTATE in ALL patients with severe Clostridium difficile

Contact Consultant Microbiologist for all severe cases

Antibiotic 1st Line

Stop all antibiotics - if this is **NOT** possible discuss with microbiologist.

Vancomycin 500mg **ORALLY** 6 hourly

PLUS

Metronidazole 500mg IV 8 hourly

Total duration of therapy 10 days

3.4.1.5.5 RECURRENT INFECTION

Clostridium Difficile infection (CDI)

ACID SUPPRESSING MEDICATIONS SHOULD BE REVIEWED IN ALL PATIENTS WITH CLOSTRIDIUM DIFFICILE AND WHERE APPROPRIATE STOPPED

Microbiological specimens

- Acute diarrhoea (Bristol stool chart 5-7): Stool sample which take the shape of container must be sent ASAP for C.difficile toxin testing if longer than 28 days since last test. Or if toxin test negative on previous specimen.

RECURRENT INFECTION

NB

Contact Consultant Microbiologist for all recurrent cases

Doses of up to 500mg Vancomycin can be used **BUT** must be under microbiologist/gastroenterologist advice **ONLY**

Antibiotics - 1st Line

Stop all antibiotics. If not possible discuss with microbiologist.

Vancomycin 125mg **ORALLY** 6 hourly

Discuss duration with a Consultant Microbiologist

2nd Line

Fidaxomicin 200mg orally 12 hourly

THIS AGENT MUST ONLY BE USED ON THE ADVICE OF A CONSULTANT MICROBIOLOGIST/MDT AND WILL NOT BE SUPPLIED BY PHARMACY UNTIL THIS HAS BEEN CONFIRMED

3.4.1.6 GIARDIASIS

Giardiasis

Microbiological specimens

- Chronic diarrhoea/Giardia/helminth infections: 3 or more stool samples maybe required

Discuss with Consultant Microbiologist

Antibiotic - 1st Line

Metronidazole 400mg orally 8 hourly for **5 Days**

or

Metronidazole 2g orally every 24 hours for **3 days**

3.4.1.7 AMOEBIASIS

Amoebiasis

Microbiological specimens

- Fresh sample transported to laboratory ASAP

Discuss with Consultant Microbiologist if amoebiasis suspected

Antibiotic - 1st Line

Metronidazole 400mg orally 8 hourly **for 5 days**

3.4.1.8 GASTROENTERITIS

Gastroenteritis

Antibiotics not indicated for self limiting gastroenteritis

Antibiotics

NO antibiotics indicated

3.4.1.9 SALMONELLA / SHIGELLA GASTROENTERITIS

Salmonella/Shigella Gastroenteritis and Enteric fever

Microbiological specimens

- Stool sample(s)
- Take Blood Culture if pyrexial/immunocompromised or enteric fever
- **Food poisoning is a notifiable disease**

Antibacterial treatment is not usually indicated, frequently self limiting.

Antibiotic - 1st Line For Invasive Disease and Enteric Fever

Ceftriaxone 2g IV every 24 hours

Oral step down:

Ciprofloxacin 500mg orally 12 hourly **for 5 days if sensitive**

Or

Azithromycin 500mg orally once a day **for 7 days**

2nd Line or pencillin allergy

If anaphylaxis discuss alternative with microbiologist

3.4.1.10 CAMPYLOBACTER INFECTION

Campylobacter Infection

Microbiological specimens

- Stool sample

- Frequently self-limiting
- Antibiotics rarely required
- Consider in severely ill, elderly, immunocompromised or patients with worsening or prolonged symptoms
- If treatment indicated discuss with microbiologist

Antibiotics

Antibiotics NOT indicated

3.4.1.11 CRYPTOSPORIDIUM INFECTION

Cryptosporidium Infection

Microbiological specimens

- Stool sample

Antibiotics

No antibiotics available - condition is self-limiting

3.4.1.12 E COLI O157

3.4.1.13 SMALL INTESTINAL BACTERIAL OVERGROWTH

3.4.1.13.1 FIRST & SECOND LINE TREATMENT

4 SMALL INTESTINAL BACTERIAL OVERGROWTH (SIBO)

First Line Treatment

Metronidazole oral 400 mg three times daily for 7 days

Second Line Treatment

Ciprofloxacin oral 500 mg twice daily for 7 days

4.1.1.1.1 NOTE ON RIFAXIMIN

Rifaximin for SIBO

Whilst a reasonable body of evidence exists supporting Rifaximin, its high cost currently precludes its use.

4.1.2 HEPATO-BILIARY SYSTEM

4.1.2.1 UNCOMPLICATED BILIARY COLIC

Uncomplicated Biliary Colic

No antibiotics required unless evidence of impending sepsis

4.1.2.2 CHOLECYSTITIS / CHOLANGITIS

Cholecystitis / Cholangitis

Microbiology specimens

- **Blood culture**

Antibiotic - 1st Line

Amoxicillin 1g IV 8 hourly

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See the "Gentamicin dosing and monitoring" section of the formulary in "Useful Tool" for dose calculation/monitoring)

Oral step down refer to sensitivities

If no sensitivities available:

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy 5 days

Amoxicillin and Metronidazole do NOT provide sufficient Gram negative cover and should not be used as an oral switch option

Second Line / Penicillin allegy

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See the "Gentamicin dosing and monitoring" section of the formulary in "Useful Tool" for dose calculation/monitoring)

Oral step down refer to sensitivities

If no sensitivities available:

Trimethoprim 200mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

OR in more severe cases

Ciprofloxacin 500mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

Total duration of therapy 5 days

4.1.2.3 BILIARY SEPSIS

Biliary Sepsis

Microbiology specimens

- **Blood culture**

Antibiotic - 1st Line

Amoxicillin 1g IV 8 hourly

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See the "Gentamicin dosing and monitoring" section of the formulary in "Useful Tool" for dose calculation/monitoring)

Oral step down refer to sensitivities

If no sensitivities available:

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy 5 days

Amoxicillin and Metronidazole do NOT provide sufficient Gram negative cover and should not be used as an oral switch option

Second Line / Penicillin allergy

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See the "Gentamicin dosing and monitoring" section of the formulary in "Useful Tool" for dose calculation/monitoring)

Oral step down refer to sensitivities

If no sensitivities available:

Trimethoprim 200mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

OR in more severe cases

Ciprofloxacin 500mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

Total duration of therapy 5 days

4.1.2.4 ACUTE PANCREATITIS (MILD / MODERATE)

Acute Pancreatitis (Mild/Moderate)

****Oedematous or mild acute pancreatitis (predominant form/self limiting)****

Antibiotic - 1st Line

Antibiotics **NOT** indicated

4.1.2.5 ACUTE PANCREATITIS (SEVERE)

Acute Pancreatitis (Severe)

Microbiology specimens

- **Blood culture**
- **Pancreatic fluid if drained**

For complicated infections such as pancreatic necrosis and liver abscess it is important to remember that the regimens are initial recommendations and review of culture results and discussion with a Microbiologist is essential.

- Antibiotic therapy should **ONLY** be considered where evidence of > 30% pancreatic necrosis
- Diagnosis requires imaging
- Early referral to Critical Care Team recommended
- Discuss with microbiologist if previous results show MRSA/ESBL/CDI

Antibiotic - 1st Line

Amoxicillin 1g IV 8 hourly

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See the "Gentamicin dosing and monitoring" section of the formulary in "Useful Tool" for dose calculation/monitoring)

Oral step down refer to sensitivities

If no sensitivities available:

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy 5 - 7 days

2nd Line or penicillin allergy

Teicoplanin 800mg IV 12 hourly for 3 doses then 800mg once daily

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See the "Gentamicin dosing and monitoring" section of the formulary in "Useful Tool" for dose calculation/monitoring)

Discuss oral step down options with microbiologist

Total duration of therapy 5 - 7 days

4.1.2.6 LIVER ABSCESS

Liver Abscess

Microbiology specimens

- **Blood culture**
- **Guided aspirates from abscess cavities**

- **Hydatid serology / amoebic serology**

For complicated infections such as pancreatic necrosis and liver abscess it is important to remember that the regimens are initial recommendations and review of culture results and discussion with a Microbiologist is essential.

Discuss with microbiologist about **ALL** cases and duration of therapy

Antibiotic - 1st Line

Amoxicillin 1g 8 hourly (oral or IV)

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See the "Gentamicin dosing and monitoring" section of the formulary in "Useful Tool" for dose calculation/monitoring)

Oral step down refer to sensitivities and discuss with microbiologist

2nd Line or penicillin allergy

Teicoplanin 800mg IV 12 hourly for 3 doses then 800mg once daily

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See the "Gentamicin dosing and monitoring" section of the formulary in "Useful Tool" for dose calculation/monitoring)

Oral step down refer to sensitivities and discuss with microbiologist.

4.1.2.7 VARICEAL BLEEDING

Variceal Bleeding

Ciprofloxacin and Metronidazole can be given **ORALLY** if patient not nil-by-mouth

Common Pathogens

â€¢ Coliforms
â€¢ Anaerobes
â€¢ Group D Strep

Antibiotic - 1st Line

Co-amoxiclav 1.2g IV 8 hourly

Total duration of therapy 3 days

2nd Line or pencillin allergy

Teicoplanin 800mg IV **SINGLE DOSE ONLY**

PLUS

Ciprofloxacin 500mg orally 12 hourly (only use IV if patient nil-by-mouth)

PLUS

Metronidazole 400mg orally 8 hourly (only use IV if patient nil-by-mouth)

Total duration of therapy 3 days

4.1.2.8 SPONTANEOUS BACTERIAL PERITONITIS (SBP)

4.1.2.8.1 TREATMENT

Spontaneous Bacterial Peritonitis - Treatment

Microbiology specimens

- **Blood culture**
- **Ascitic fluid tap**

Diagnosis: Ascitic total white cell count **>0.25 x 10^9/L**

Antibiotic - 1st Line

Co-amoxiclav 1.2g IV 8 hourly

Review IV antibiotics no later than 48 hours

Step down to oral therapy (review sensitivities):

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy 5 days

2nd Line or pencillin allergy

Teicoplanin 800mg IV 12 hourly for 3 doses then 800mg once daily

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See the "Gentamicin dosing and monitoring" section of the formulary in "Useful Tool" for dose calculation/monitoring)

Review IV antibiotics no later than 48 hours

Oral step down:

Co-Trimoxazole 960mg 12 hourly

Total duration of therapy 5 days

4.1.2.8.2 SECONDARY PROPHYLAXIS

Spontaneous Bacterial Peritonitis - Secondary Prophylaxis

On advice of consultant gastroenterologist

Only consider for patients with >1 episode of SBP

Antibiotic - 1st Line

Co-Trimoxazole 960mg orally once daily

Monitor serum potassium â€“ patients at increased risk of hyperkalaemia if on concomitant ACEI/A2RB or spironolactone

Antibiotic - 2nd Line

Ciprofloxacin 500mg orally once daily

The above can be considered as an alternative if co-trimoxazole is not appropriate â€“ clear documentation must be made by Consultant gastroenterologist **ONLY** - Only consider for patients with >1 episode of SBP

4.1.3 RESPIRATORY SYSTEM

4.1.3.1 COMMUNITY-ACQUIRED PNEUMONIA

4.1.3.1.1 CURB-65 SCORING AND ASSESSMENT

CURB 65

Confusion (AMT <8); Urea >7 mmol/L; Resp rate >30/min: BP <90 systolic or <60 diastolic; 65:age > 65-yrs

BTS Predictor of increased mortality **(Score [0] 0.7%; Score [1] 3.2%; Score [2] 13%; Score [3] 17%; Score [4] 41.5%; Score [5] 57%**

Assessing Community Acquired Pneumonia

- Calculate CURB-65 score (see above)
- Caution with CURB-65 scores on the borderline between non-severe and severe pneumonia classifications
- Clinical judgement required depending on presence of additional adverse prognostic factors (see below)
- Start antibiotics as soon as possible and remember to fill in Advancing Quality (AQ) form with time of first dose
- Consider HIV test
- If no evidence of consolidation on CXR then revise diagnosis and treatment

Additional adverse prognostic factors

- Co-morbidities
- PaO_2 < 8kPa on air
- Multilobar or bilateral involvement on CXR

- Positive Legionella urine antigen test

Discuss with Critical Care Team for patients with a CURB-65 score of 4-5

4.1.3.1.2 CURB-65 SCORE 0-1

Community Acquired Pneumonia - CURB Score 0 - 1

Microbiological specimens

Low severity Community Acquired Pneumonia (CURB-65 score 0-1)

- Do not routinely offer microbiological tests

BTS CURB 65 score interpretation:

0-1 = Low risk of death and may be suitable for treatment at home

Antibiotic - 1st Line

Amoxicillin 500mg orally 8 hourly

Total duration of therapy 5 days

2nd Line or Penicillin allergy

Doxycycline 200mg orally STAT on day 1, then 100mg orally every 24 hours

Total duration of therapy 5 days

4.1.3.1.3 CURB-65 SCORE 2

Community Acquired Pneumonia - CURB-65 score 2

Microbiological specimens

Moderate severity Community Acquired Pneumonia (CURB-65 score 2)

- Blood cultures (prior to antibiotics if possible)

BTS CURB 65 score interpretation:

2 = moderate risk of death usually have short duration inpatient treatment

Antibiotic - 1st Line

Amoxicillin 500mg orally 8 hourly

PLUS

Clarithromycin 500mg orally 12 hourly

If oral route not available

Benzylpenicillin 1.2g IV 6 hourly

PLUS

Clarithromycin 500mg IV 12 hourly - **ONLY** use IV if oral route unavailable

Total duration of therapy 5-7 days

2nd Line or Penicillin allergy

Doxycycline 200mg orally STAT on day 1, then 100mg orally every 24 hours

If oral route not available:

Clarithromycin 500mg IV 12 hourly

Total duration of therapy 5-7 days

4.1.3.1.4 CURB-65 SCORE 3-5

Community Acquired Pneumonia - Score 3-5

Discuss with Critical Care Team for patients with a CURB-65 score of 4-5

BTS CURB 65 score interpretation:
3-5 High risk of death and require urgent hospital admission.

Microbiological specimens

Severe Community Acquired Pneumonia

- Blood culture for ALL â€“ Reason must be documented if blood culture is not taken
- Urine for Pneumococcal and Legionella antigen in a white top sample bottle
- Send blood for mycplasma serology
- Take a CRP
- Repeat CRP and consider repeating CXR after 48-72 hours if progress not satisfactory
- Sputum for culture and sensitivity if bringing up sputum
- Send Mycoplasma serology and Nasopharyngeal Aspirate (NPA) or viral nose and throat swabs for influenza PCR in viral transport media if suspected
- Culture including Legionella culture of samples obtained by bronchoscopy

Clinical Condition

BTS CURB 65 score interpretation:

3-5 = High risk of death and require urgent hospital admission

4-5 Consider for Critical Care Assessment

NOTE - Severe CAP with MRSA or necrotising pneumonia, discuss with Consultant Microbiologist.

Antibiotic - 1st Line

Co-amoxiclav 1.2g IV 8 hourly

PLUS

Clarithromycin 500mg orally 12 hourly - **ONLY** use IV if oral route unavailable

Review IV antibiotics no later than 48 hours.

Step down to oral therapy with:

Amoxicillin 500mg orally 8 hourly

PLUS

Clarithromycin 500mg orally 12 hourly unless evidence of resistance from cultures - **ONLY** use IV if oral route unavailable

Total duration of therapy 7 days

If it is Legionella:

Clarithromycin 500mg IV 12 hourly, step down to **oral Clarithromycin** 500mg 12 hourly when appropriate

Duration of therapy 14 to 21 days

2nd Line or Penicillin allergy

Teicoplanin 800mg 12 hourly for 3 doses then 800 mg once daily

PLUS

Ciprofloxacin 500mg orally 12 hourly- **ONLY** use IV if oral route unavailable (400mg IV 12 hourly)

Review IV antibiotics no later than 48 hours

Step down to oral therapy with:

Doxycycline 200mg 12 hourly when appropriate

Total duration of therapy 7 days

4.1.3.1.5 CRITICAL CARE UNIT PATIENTS ONLY

Community Acquired Pheumonia - Severe - For Critical Care Unit ONLY

Antibiotic - 1st Line

Piperacillin + Tazobactam - see Critical Care Guideline for dosing

PLUS

Clarithromycin 500mg IV 12 hourly

2nd Line or Penicillin allergy

Vancomycin IV - for dosing see continuous infusion protocol on Critical Care Unit

PLUS

Ciprofloxacin 400mg IV 12 hourly

4.1.3.2 HOSPITAL ACQUIRED PNEUMONIA

4.1.3.2.1 NON SEVERE

Hospital Acquired Pneumonia - Non Severe

Should have consolidation on CXR for this diagnosis to be made

NB:

If antibiotics given in last 2 weeks: Discuss with Consultant Microbiologist

Choice of antibiotic based on severity & previous culture results.

Common pathogens:

Steptococcus pneumoniae (most common)
Gram negative bacilli
If MRSA colonised / suspected - discuss with Microbiology

Antibiotic - 1st Line

Doxycycline 200mg orally start on day 1, then 100mg orally 24 hourly

Total duration of therapy 5 days

4.1.3.2.2 SEVERE - NON CRITICAL CARE PATIENTS

Hospital Acquired Pneumonia - Severe

RR>30/min, Hypoxia (PaO_2 <8 kPa or <92% on any FIO_2), BP systolic <90 or diastolic $\leq$ 60

New mental confusion

NB:

Choice of antibiotic based on severity & previous culture results

Risk of PSEUDOMONAS AERUGINOSA in immunocompromised patients, those recently on ICU, prior broad spectum antibiotic use or structural lung disease

If antibiotics given in last 2 weeks: discuss with Consultant Microbiologist

Common Pathogens:

Streptococcus pneumoniae (most common)
Gram negative bacilli
If MRSA colonised/suspected - discuss with Microbiology

Antibiotic - 1st Line

Piperacillin + Tazobactam 4.5g IV 8 hourly

Review IV antibiotics no later than 48 hours

Oral step down to

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy 5 - 7 days

2nd Line or Pencillin allergy

Non anaphylaxis

Meropenem 1g IV 8 hourly

Review at 48 hours

Oral step down to:

Doxycycline 100mg orally 12 hourly when appropriate

Total duration of therapy 5-7 days

Anaphylaxis

Ciprofloxacin 500mg orally 12 hourly - use IV **ONLY** if patient NBM (400mg IV 12 hourly)

PLUS

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily

at 48 hours

Oral step down to:

Doxycycline 100mg orally 12 hourly when appropriate

Total duration of therapy 5-7 days

4.1.3.2.3 SEVERE - CRITICAL CARE PATIENTS ONLY

RR>30/min, Hypoxia (PaO_2 <8 kPa or <92% on any FIO_2), BP systolic <90 or diastolic < 60

New mental confusion

NB:

Choice of antibiotic based on severity & previous culture results

Risk of PSEUDOMONAS AERUGINOSA in immunocompromised patients, those recently on ICU, prior broad spectum antibiotic use or structural lung disease

If antibiotics given in last 2 weeks: discuss with Consultant Microbiologist

Common Pathogens:

Streptococcus pneumoniae (most common)
Gram negative bacilli
If MRSA colonised/suspected - discuss with Microbiology

Antibiotic - 1 st Line

Piperacillin + Tazobactam - see Critical Care Guideline for dosing

Review IV antibiotics no later than 48 hours

2 nd Line or Pencillin allergy (non anaphylaxis)

Meropenem 1g IV 8 hourly

Review at 48 hours

Oral step down to:

Doxycycline 100mg orally 12 hourly when appropriate

Total duration of therapy 5-7 days

2 nd Line or Pencillin allergy (Anaphylaxis)

Ciprofloxacin 500mg orally 12 hourly - use IV **ONLY** if patient NBM (400mg IV 12 hourly)

PLUS

Vancomycin IV - for dosing see continuous infusion protocol on Critical Care Unit

Review at 48 hours

4.1.3.3 PNEUMOCYSTIS PNEUMONIA (PCP)

4.1.3.3.1 TREATMENT

Pneumocystis Pneumonia (PCP) - Treatment

NB

Infection with: PNEUMOCYSTIS JIROVECII

Send BAL specimen, sputum or EDTA blood to lab

Consult Respiratory physician and GUM

Adjunctive steroid treatment started within 72 hours can be life saving see BNF

Intravenous and oral preparations are bioequivalent. Use oral whenever possible.

Antibiotic - 1st Line

Co-Trimoxazole 120mg/kg daily in 2-4 divided doses oral or IV for mild and severe

Total duration of therapy 14-21 days

Weight (kg)	Total daily dose Co-trimoxazole (mg)	Suggested dose Co-trimoxazole (mg) 06:00; 12:00; 18:00; 24:00hrs
40	**4800**	**1440; 960; 960; 1440**
45	**5400**	**1440; 1440; 960; 1440**
50	**6000**	**1440; 1440; 1440; 1440**
55	**6600**	**1920; 1440; 1920; 1440**
60	**7200**	**1920; 1920; 1440; 1920**
65	**7800**	**1920; 1920; 1920; 1920**
70	**8400**	**2400; 1920; 2400; 1920**
75	**9000**	**2400; 2400; 1920; 2400**
80	**9600**	**2400; 2400; 2400; 2400**
85	**10,200**	**2880; 2400; 2400; 2400**

2nd List or Penicillin allergy

Clindamycin 450mg orally **OR** 600mg IV every 6 hours

AND

Primaquine 30mg orally once daily by mouth

Primaquine is CONTRAINDICATED in patients with G6PD

4.1.3.3.2 PROPHLYAXIS

Pneumocystis Pneumonia (PCP) - Prophylaxis

Antibiotic - 1 st Line

Co-Trimoxazole HIV positive 960mg orally once daily

Co-Trimoxazole HIV negative 480mg orally once daily

4.1.3.4 NECROTISING PNEUMONIA

Necrotising Pneumonia

Discuss with Consultant Microbiologist URGENTLY

Common pathogens

â€¢ PVL Staph aureus
â€¢ Strep pneumoniae
â€¢ Gram negative bacilli

4.1.3.5 VENTILATOR ASSOCIATED PNEUMONIA

Ventilator Associated Pneumonia - For Critical Care use ONLY

> 48 hours of mechanical ventilation

Antibiotic - 1st Line

Piperacillin-tazobactam - as per critical care guidelines

If known resistance:

Meropenem - as per critical care guidelines

Duration to be discussed on microbiology ward round.

2nd Line or Penicillin allergy

Non anaphylaxis

Meropenem as per critical care guidelines

Anaphylaxis

Ciprofloxacin 400mg IV 12 hourly

PLUS

Linezolid 600mg IV 12 hourly

Duration to be discussed on microbiology ward round.

4.1.3.6 ACUTE EXACERBATION OF COPD (NON-PNEUMONIC LRTI)

Acute Exacerbation of COPD (non-pneumonic LRTI)

DO NOT USE CURB-65 SCORING

NB

Antibiotics ARE indicated in the following:

â†‘ sputum volume

â†‘ purulence of sputum

Dyspnoea

Review treatment with culture/sensitivity results and switch to targeted oral antibiotic therapy.

Common Pathogens:

â€¢ Haemophilus influenzae
â€¢ Streptococcus pneumoniae
â€¢ Moraxcella catarrhalis
â€¢ Viruses
â€¢ Occasionally Staph aureus (post-viral exposure)

20-40% of AECOPD episodes are of non-infective aetiology and up to 30% are of viral origin (seasonal variation)

Antibiotic - 1st Line

Amoxicillin 500mg orally 8 hourly

Total duration of therapy 5 days

2 nd Line or Penicillin allergy

Doxycycline 200mg PO stat on day 1 then 100mg orally every 24 hours for 4 days

Total duration of therapy 5 days

4.1.3.7 ASPIRATION PNEUMONIA

4.1.3.7.1 COMMUNITY ACQUIRED (<48 HOURS OF ADMISSION)

Aspiration Pneumonia - Community Acquired

< 48 hours of admission

NB

Review oral switch at 48 hours

Infection is indicated by change in sputum quality to purulent / mucopurulent, fever and new chest X-ray changes

Aspiration pneumonitis does **NOT** require antibiotics

Consider aspiration pneumonia if there is a history of impaired swallowing or vomiting with possible aspiration > 48 hr before

ONLY USE IV ROUTE IF ORAL ROUTE UNAVAILABLE FOR CIPROFLOXACIN AND CLARITHROMYCIN

Antibiotics - 1 st Line

Co-amoxiclav 1.2g IV 8 hourly

Step down to oral therapy with:

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy 5 days

2 nd Line or Penicillin allergy

Clarithromycin 500mg PO 12 hourly (only use IV if oral route unavailable)

PLUS

Metronidazole 400mg PO 8 hourly (only use IV if oral route unavailable)

Step down to oral therapy with

Clarithromycin 500mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

Total duration of therapy 5 days

4.1.3.7.2 HOSPITAL ACQUIRED (>48 HOURS OF ADMISSION)

Aspiration Pneumonia - Hospital Acquired

> 48 hours of admission

NB

Review oral switch at 48 hours

Infection is indicated by change in sputum quality to purulent/mucopurulent, fever and new chest X-ray changes

Aspiration pneumonitis does NOT require antibiotics

Consider aspiration pneumonia if there is a history of impaired swallowing or vomiting with possible aspiration > 48 hr before

ONLY USE IV ROUTE IF ORAL ROUTE UNAVAILABLE FOR CIPROFLOXACIN AND CLARITHROMYCIN.

Common Pathogens

Oral flora including:
â€¢ Streptococcus pneumoniae
â€¢ Haemophillus influenzae
â€¢ Anaerobes
â€¢ Pseudomonas
â€¢ Staph aureus

Antibiotic - 1st Line

Piperacillin-tazobactam 4.5g IV 8 hourly

Review IV antibiotics no later than 48 hours

Step down to oral therapy with:

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy 5 days

2nd Line or Penicillin allergy

Non anaphylaxis

Meropenem 1g IV 8 hourly

Total duration of therapy 5 days

Anaphylaxis

Ciprofloxacin 500mg orally 12 hourly - ONLY use IV if NBM (400mg 12 hourly)

PLUS

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily

PLUS

Metronidazole 500mg IV 8 hourly

Step down to oral therapy with:

Ciprofloxacin 500mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

Total duration of therapy 5 days

4.1.3.8 TUBERCULOSIS

Tuberculosis

NB

All suspected cases of TB should be drawn to the attention of: Dr S Wilson or Dr I Hafeez and Infection Prevention and Control Team

Common Pathogens

If Tuberculosis is suspected: perform 3 separate sputum samples for TB.

For miliary TB EMU x3

4.1.3.9 CYSTIC FIBROSIS

Cystic Fibrosis

Adult patients are dealt with by University Hospital of South Manchester

4.1.3.10 INFECTIVE EXACERBATION OF BRONCHIECTASIS

Infective Exacerbation of Bronchiectasis

NB

These treatment regimens are empiric and must only be used where the culture / sensitivity results are NOT known

Refer to previous culture / sensitivity results for recurrent episodes

Discuss with respiratory physician if PSEUDOMONAS is suspected

Common Pathogens

â€¢ Haemophilus influenzae
â€¢ Streptococcus pneumoniae
â€¢ Moraxella catarrhalis
â€¢ Viruses
â€¢ Occasional Staph aureus - (post-viral episode)

Antibiotic - 1st Line

Amoxicillin 500 mg orally 8 hourly

Total duration of treatment 10-14 days

Further need for antibiotics should be guided by clinical response

2nd Line or Penicillin allergy

Clarithromycin 500mg orally 12 hourly

Total duration of treatment 10-14 days

4.1.3.11 EMPYEMA

4.1.3.11.1 ACUTE

Empyema - Acute

** **may be a complication of pneumonia**

NB

- Take blood culture
- Involve respiratory physician
- Diagnostic pleural aspiration
- Review after 48 hours and modify therapy according to sensitivities

Common Pathogens

â€¢ Pneumococci
â€¢ Gp A Streptococci

Â€¢ STAPHYLOCOCCUS AUREUS

Antibiotic - 1st Line

Co-amoxiclav 1.2g IV 8 hourly

Review at 48 hours

Oral step down to:

Co-amoxiclav 625mg orally 8 hourly if no sensitivities available

2nd Line or Pencillin allergy

Clindamycin 450mg - 600mg IV / 450mg oral 6 hourly

4.1.3.11.2 SUBACUTE / CHRONIC

Empyema - Subacute or Chronic

NB

Common Pathogens

â€¢ Streptococcus milleri
â€¢ Anaerobes
â€¢ Enterobacteriaceae
â€¢ Mycobacterium tuberculosis

Antibiotic - 1st Line

Co-amoxiclav 1.2g IV 8 hourly

OR

Co-amoxiclav 625mg orally 8 hourly

Duration of therapy minimum of 3 weeks (with adequate drainage) and based on clinical biochemical and radiological response.

2nd Line or Penicillin allergy

Clindamycin 450mg orally 6 hourly

Duration of therapy minimum of 3 weeks (with adequate drainage) and based on clinical, biochemical and radiological response.

4.1.3.12 LUNG ABSCESS

4.1.3.13 INFLUENZA

4.1.3.13.1 OUTPATIENTS

Influenza - patient not admitted to hospital

NB

Isolate patient, wear surgical mask in room when within 1 metre of patient. If admitted inform Infection Prevention and Control Team.

Send NPA for PCR

Oseltamivir is preferred option for pregnancy

Zanamivir is the preferred option if severely immunocompromised.

Diskhaler **Zanamivir** must **NEVER** be nebulised or given to mechanically ventilated patients

Antibiotic - 1st Line

Nil required unless complicated influenza, severely immunocompromised or pregnant.

4.1.3.13.2 INPATIENTS

Influenza - Patient admitted to hospital

NB

Isolate patient, wear surgical mask in room when within 1 metre of patient. If admitted inform Infection Prevention and Control Team.

Send NPA for PCR

Oseltamivir is preferred option for pregnancy

Zanimivir is the preferred option if severely immunocompromised r

Diskhaler **Zanimivir** must **NEVER** be nebulised or given to mechanically ventilated patients

Antibiotic - 1st Line

Oseltamivir PO/NG 75mg 12 hourly

Total duration of therapy 5 days

2nd Line or Penicillin allergy

Zanimivir INHALED 10mg 12 hourly

Total duration of therapy 5 days

4.1.4 URINARY TRACT

4.1.4.1 USEFUL INFORMATION FOR URINARY INFECTIONS

Useful information for Urinary Tract Infections

These are empiric treatment guidelines.

Always check previous culture results to ensure that these recommendations are appropriate for the individual patient and review antibiotics when current culture results become available.

Microbiological Specimens

Dipstick testing is neither sensitive nor specific for infection and should NOT be routinely performed, and NEVER in catheterised patients or those with other prosthetic material in situ.

- If patient has urinary symptoms or other suggestion of UTI, send MSU for culture and sensitivity (or catheter urine although a raised white cell count is not diagnostic of UTI in a catheterised patient and positive culture in these patients may represent catheter colonisation rather than infection).

For diagnosis of prostatitis an MSU post prostatic massage may be indicated.

Check BNF or the "ANTIBIOTIC DOSING RECOMMENDATIONS" in the **Useful Tools** section of the app for dose adjustments in renal impairments

References

https://www.nice.org.uk/guidance/qs90

http://www.sign.ac.uk/guidelines/fulltext/88/recommendations.html

http://www.bashh.org/documents/3546.pdf

4.1.4.2 UNCOMPLICATED UTI (PATIENTS WITH NO CATHETER)

Uncomplicated UTI

(in patients without catheter or other prosthetic material in situ)

NB: ***Trimethoprim*** *must NOT be used in patients on Methotrexate*

Common Pathogens

E.coli
Group D Streptococcus

Staphylococcus saprophyticus

Antibiotic - 1st line / Second Line or Penicillin Allergy

Nitrofurantoin 50mg orally 6 hourly

OR

Trimethoprim 200mg orally 12 hourly

Total duration of therapy:

- 3 days (Female)
- 7 days (Males)

4.1.4.3 ASYMPTOMATIC BACTERIURIA

Asymptomatic Bacteriuria

Asymptomatic bacteriuria is common in elderly patients and is NOT related to increased morbidity or mortality Do NOT treat asymptomatic in non-pregnant patients with positive urine cultures.

Dipstick testing for diagnosis of UTI is unhelpful in patients >65 years

4.1.4.4 ASYMPTOMATIC BACTERIURIA IN PREGNANCY

Asymptomatic Bacteriuria in Pregnancy

NB: State gestational age on specimen request forms so that appropriate sensitivities can be released.

Common Pathogens

Coliforms
Group D Streptococcus

Antibiotic 1st line / 2nd line or Penicillin Allergic

Under 12 weeks gestation

Nitrofurantoin 50mg orally 6 hourly

Total duration of therapy 7 days

Ensure urine culture repeated after 7 days to ascertain clearance of infection

Over 12 weeks gestation

Trimethoprim 200mg orally 12 hourly

Total duration of therapy 7 days

Ensure urine culture repeated after 7 days to ascertain clearance of infection.

4.1.4.5 UTI PROPHYLAXIS

UTI Prophylaxis

NB:

- ***Trimethoprim*** MUST **NOT** BE USED IN PATIENTS ON METHOTREXATE
- UTI PROPHYLAXIS Â€“ **NOT** TO BE CONSIDERED FOR PATIENTS WITH URINARY CATHETERS OR OTHER PROSTHETIC MATERIAL IN SITU.

Antibiotic 1st Line / 2nd line or Penicillin allergy

Trimethoprim 100mg orally at night

OR

Nitrofurantoin 100mg orally at night

MAXIMUM treatment duration 6 months

Use of any other agents for UTI prophylaxis **MUST** be discussed with Consultant Microbiologist before prescribing and will not be otherwise dispensed.

4.1.4.6 CATHETERISED PATIENTS

Catheterised Patients

ANTIBIOTICS ARE NOT REQUIRED UNLESS THE PATIENT IS SYSTEMICALLY UNWELL OR FEBRILE AND THIS IS BEING ATTRIBUTED TO A UTI. IN THESE CASES TREAT AS PER UROSEPSIS GUIDANCE.

SEND CATHETER SPECIMEN OF URINE IN THE ABOVE CIRCUMSTANCES.

DO ***NOT*** DO DIPSTICK TESTING IN CATHETERISED PATIENTS.

4.1.4.7 UROSEPSIS/PYELONEPHRITIS

Urosepsis / Pyelonephritis

NB

Total duration of antibiotics (including time spent on IV should be 14 days except where Ciprofloxacin is the oral switch used. Where Ciprofloxacin is the oral switch, Total duration of antibiotics (including time spent on IV antibiotics) should be 7 days.

Common Pathogens

Coliforms

Antibiotic - 1st line

Gentamicin (See â€œGentamicin dosing and monitoringâ€• section of the "Useful Tools" section of the formulary for dose calculation/monitoring) - **NOT for use if Creatinine Clearance (CrCl) <30mL/min**

If CrCl <30mL/min: Piperacillin-tazobactam 4.5g IV & **Review at 48 hours.** (See "Antibiotic Dosing Recommendations" in the "Useful Tools" section of the Formulary for renal dosing of Tazocin.)

EMPIRIC Oral Step Down (in order of preference):

Trimethoprim 200mg orally 12 hourly

OR

Pivmecillinam 400mg orally 8 hourly

Total duration of therapy (including time spent on IV antibiotics) should be 14 days

OR

Ciprofloxacin 500mg orally 12 hourly - where Ciprofloxacin is the oral switch, total duration of antibiotics (including time spent on IV antibiotics) should be 7 days.

IF SENSITIVITIES AVAILABLE Oral Step Down (in order of preference):

If sensitivities available oral step down in order of preference:

Trimethoprim 200mg orally 12 hourly

OR

Amoxicillin 500mg orally 8 hourly

OR

Pivmecillinam 400mg orally 8 hourly

Total duration of therapy (including time spent on IV antibiotics) should be 14 days

2nd Line / Penicillin Allergy

Gentamicin - **NOT for use if Creatinine Clearance (CrCl) <30mL/min**

If CrCl <30mL/min:

Ciprofloxacin 500mg PO 12 hourly **ONLY** use IV if oral route unavailable (400mg IV 12 hourly).

Review at 48 hours. For oral step down, refer to sensitivities.

Oral Step Down after 48 hours (in order of preference + check sensitivity results):

Trimethoprim 200mg orally 12 hourly

Total duration of therapy (including time spent on IV antibiotics) should be 14 days

OR

Ciprofloxacin 500mg orally 12 hourly - where Ciprofloxacin is the oral switch, total duration of antibiotics (including time spent on IV antibiotics) should be 7 days

4.1.4.8 ACUTE PROSTATITS

4.1.4.8.1 PATIENTS <35 YEARS

Acute Prostatitis in patients <35 years

NB

See STI guidelines & refer to GUM. Treat sexual partners also.

Common Pathogens

Coliforms, Chlamydia, N.Gonorrhoea

Antibiotic - 1st line / 2nd line or Penicillin allergy

Ciprofloxacin 500mg PO 12 hourly.

Total Duration of therapy 28 days.

If evidence of septic shock:

Piperacillin-tazobactam 4.5 g IV 8 hourly

Review at 48 hours.

If sensitive to Trimethoprim, or if no sensitivities available, change to:

Trimethoprim 200mg orally 12 hourly.

If evidence of septic shock AND Penicillin allergy

Discuss choice with Microbiologist

4.1.4.8.2 PATIENTS >35 YEARS

Acute Prostatitis in patients >35 years

NB

See STI guidelines & refer to GUM. Treat sexual partners also.

Only use IV Ciprofloxacin if the patient is strictly NBM.

Common Pathogens

Coliforms, Chlamydia, N.Gonorrhoea

Antibiotic - 1st line

Trimethoprim 200mg PO 12 hourly.

Total Duration of therapy 28 days.

If evidence of septic shock:

Piperacillin-tazobactam 4.5g IV 8 hourly & **Review at 48 hours.**

Oral step down:

If sensitive to Trimethoprim, or if no sensitivities available, change to

Trimethoprim 200mg PO 12 hourly.

2nd Line / Penicillin Allergy

Trimethoprim 200mg PO 12 hourly.

Total Duration of therapy 28 days.

If evidence of septic shock:

Ciprofloxacin 500mg PO 12 hourly.

PLUS

Gentamicin 5mg/kg IV every 24 hours* (max dose 400mg). **Review at 48 hours.**

Oral step down:

If sensitive to Trimethoprim, or if no sensitivities available, change to:

Trimethoprim 200mg PO 12 hourly.

4.1.4.9 CHRONIC PROSTATITIS

Chronic Prostatitis

NB

Inflammation of the prostate may be bacterial or non-infective.

>90% of cases of chronic prostatitis and are classified as Chronic Pelvic Pain Syndrome.

Antibiotic - 1st line / 2nd line or Penicillin allergy

Empiric treatment is not recommended - await a positive culture.

Treatment is not indicated if culture is negative.

If sensitive, treatmen options include:

Trimethoprim 200mg PO twice daily for 4-6 weeks

OR

Ciprofloxacin 750mg PO twice daily for 4-6 weeks

4.1.4.10 EPIDIDYMO-ORCHITIS

4.1.4.10.1 PATIENTS <35 YEARS

Epididymo-orchitis in patients <35 years

Common Pathogens

Coliforms

Antibiotic - 1st line

Ceftriaxone 500mg IM single dose.

PLUS

Doxycycline 100mg PO 12 hourly

Total duration of therapy 10-14 days.

2nd Line / Penicillin Allergy

Discuss options with Consultant Microbiologist for patients who have a contraindication to IM Ceftriaxone.

PLUS

Doxycycline 100mg PO 12 hourly.

4.1.4.10.2 PATIENTS >35 YEARS

Epididymo-orchitis in patients >35 years

NB:

If patients are at an increased risk of having STIs, follow the guidance for patients <35 years.

Common Pathogens

Coliforms

Antibiotic - 1st line / 2nd line or Penicillin Allergy

Ciprofloxacin 500mg PO 12 hourly

Total duration of therapy 10-14 days.

4.1.5 EYE

4.1.5.1 CONJUNCTIVITIS

Conjunctivitis

NB

If herpetic, seek specialist opthalmology advice.

Both viral and bacterial swabs may be required

COMMON PATHOGEN(S)

Usually viruses- Antibiotics not effective

Strep pneumoniae
H. influenzae
S. aureus

Antibiotic - 1st Line

Chloramphenicol 0.5% eye drops 2-hourly until infection controlled, then 6 hourly until 48 hours after healing.

4.1.5.2 PERI-ORBITAL / PRE-SEPTAL CELLULITIS

Periorbital / Pre-septal Cellulitis

NB

Start topical Chloramphenicol 1% ointment four times daily if associated conjunctivitis

Start Xylometazoline 0.05% nasal drops twice a day into both nostrils

Antibiotic - 1st Line

Co-amoxiclav 625mg orally 8 hourly

OR

Co-amoxiclav 1.2g IV 8 hourly

Course length should not exceed 14 days

2nd line (Penicillin allergy not anaphylaxis)

Clindamycin 450mg orally 6 hourly

OR

Clindamycin 600mg IV 6 hourly

Course length should not exceed 14 days

4.1.5.3 ADULT ORBITAL CELLULITIS

Adult Orbital Cellulitis

NB

Start topical Chloramphenicol 1% ointment four times daily if associated conjunctivitis

Start Xylometazoline 0.05% nasal drops twice a day into both nostrils

Antibiotic - 1st line

Ceftriaxone 2g IV once daily
PLUS
Flucloxacillin 1g IV 6 hourly

PLUS

Metronidazole 500mg IV 8 hourly

Review daily - IV to oral switch should occur once patient is afebrile and eye lids and orbital findings have begun to reduce (usually at day 3-5 days)

Discuss oral switch with Microbiology

Second Line / Alternative

Clindamycin 600mg IV 6 hourly
PLUS
Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily.

Review daily IV to oral switch should occur once patient is afebrile and eye lids and orbital findings have begun to reduce (usually at day 3-5 days)

Discuss oral switch with Microbiology

4.1.6 EAR NOSE & THROAT

4.1.6.1 ACUTE OTITIS MEDIA

Acute Otitis Media

NB

If mastoiditis, discuss with Microbiologist/ENT

COMMON PATHOGEN(S)

Strep pneumoniae
H influenzae

Antibiotic - 1st Line

Amoxicillin 500mg orally 8 hourly for 5 days

Second Line / Alternative

Clarithromycin 500mg orally 12 hourly for 5 days

4.1.6.2 OTITIS EXTERNA

Otitis Externa

NB

If malignant otitis externa suspected, discuss with Microbiologist

COMMON PATHOGEN(S)

Polymicrobial colonisation

Antibiotic - 1st Line

Antibiotics not usually required

4.1.6.3 SEVERE THROAT INFECTIONS / QUINSY

Severe Throat infections / Quinsy

NB

If Fusobacterium necroforum (Lemierreâ€™s disease) suspected, discuss with Microbiologist

COMMON PATHOGEN(S)

Strep pyogenes

Antibiotic - 1st Line

Phenoxymethylpenicillin (Penicillin V) (Penicillin V)
500mg PO orally 6 hourly for 10 days

(or Benzylpenicillin 1.2g IV 6 hourly if NBM)

Second Line / Alternative

Clarithromycin 500mg orally 12 hourly for 10 days

4.1.7 ORAL & MAXILLOFACIAL

4.1.7.1 IMPORTANT NOTE ON MAXFAX ANTIBIOTICS

Important Note on Antibiotic Use in Oral & Maxillofacial Surgery

NB

The primary treatment of an abscess is drainage.

The primary treatment of pericoronitis is removal of the upper wisdom tooth causing the trauma.

If there are no signs of systemic infection or spreading infection, antibiotics are rarely indicated.

Do not combine Co-amoxiclav (AugmentinÂ®) with Metronidazole.

Always check sensitivities before giving antibiotics

Many organisms rapidly develop resistance to Clarithromycin always give short courses.

Antibiotics are NOT indicated for

- Closed mandibular fractures (e.g. Condylar/subcondylar/high ramus not compound to mouth)
- Zygomatic complex not requiring insertion of a plate
- Zygomatic arch fractures
- Orbital blow-out fractures â€“ not treated with an implant
- Nasal bone fractures

Unless tetanus prone injury/fractures. If so, use Metronidazole 400mg 8 hourly orally or 500mg 8 hourly IV and follow the **Tetanus Prevention Protocol** listed in the **Surgical Prophylaxis** section of the formulary.

4.1.7.2 ORAL CANDIDIASIS

Oral Candidiasis

Antifungal - 1st line

Fluconazole 50mg orally once daily

Course length = 7 days

Fluconazole has **CLINICALLY SIGNIFICANT interactions with other medicines - check for these **BEFORE** prescribing**

Further advice can be sought from your ward based pharmacist

2nd Line when Fluconazole use contra-indicated

Nystatin 100,000units/ml - 1mL every 6 hours

Course length = 7 days

4.1.7.3 ORAL INFECTIONS (MILD-MODERATE)

Oral infections (mild-moderate)

NB

*For **Pericoronitis**, antibiotics are indicated if evidence of cellulitis of fascial planes and consider removal of upper wisdom tooth.*

Common Pathogens

Human oral flora as listed under severe infections.

Antibiotic - 1st line

Amoxicillin 500mg orally 8 hourly

PLUS

Metronidazole 400mg orally 8 hourly for 5 days

OR

Metronidazole 400mg orally 8 hourly ***alone*** for 5 days

2nd Line / Penicillin Allergy

Clarithromycin 500mg orally 12 hourly for 5 days

4.1.7.4 ORAL INFECTIONS (SEVERE)

Oral Infections (severe)

Common Pathogens

Human oral flora including:
Streptococcus mitis, Streptococcus mutans, Streptococcus salivarius/sanguis, Lactobacillus spp, Corynebacterium spp, Neisseria sp, Bacteroides spp, Actinomycetes, Peptostreptococcus, Prevotella, Veillonella spp, Fusobacterium

Hospital acquired infections:
Gram negative rods including:
Klebsiella spp, Pseudomonas spp, E. coli, Proteus

Antibiotic - 1st line

COMMUNITY ACQUIRED INFECTIONS:

Amoxicillin 1g IV 8 hourly

PLUS

Metronidazole 500mg IV 8 hourly for 24-48 hours

Oral switch to:

Amoxicillin 500mg orally 8 hourly

PLUS

Metronidazole 400mg orally 8 hourly **for 5 days**

***Hospital acquired** infections*:

Piperacillin-tazobactam (TazocinÂ®) 4.5g IV 8 hourly for 24-48 hours

Discuss with Microbiology for oral switch

2nd Line / Penicillin Allergy

***Community acquired** infections in patients allergic to penicillin:*

Clarithromycin 500mg IV 12 hourly

PLUS

Metronidazole 500mg IV 8 hourly for 24-48 hours

Oral switch to:

Clarithromycin 500mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly **for 5 days**

HOSPITAL ACQUIRED INFECTIONS IN PATIENTS ALLERGIC TO PENICILLIN:

Gentamicin (See â€œGentamicin dosing and monitoringâ€• section of the "Useful Tools" section of the formulary for dose calculation/monitoring)

PLUS

Metronidazole 400mg orally 8 hourly for **5 days**

4.1.7.5 SKIN INFECTIONS (MILD-MODERATE) / DIRTY WOUND MANAGEMENT

Skin infections (mild-moderate) / Dirty Wound Management

Common Pathogens

Staphylococcus epidermidis

Staphylococcus aureus

NB:

Send deep wound swab to Microbiology

Antibiotic - 1st line

Flucloxacillin 500mg orally 6 hourly **for 5 days**

2nd Line / Penicillin Allergy

Clarithromycin 500mg IV 12 hourly **for 5 days**

4.1.7.6 SKIN INFECTION (SEVERE)

Skin infections (severe)

COMMON PATHOGENS

Strep pyogenes (Group A Strep)

Staphylococcus aureus

NB:

For penicillin allergic patients Clarithromycin has 10% Staphylococcus aureus resistance. Please discuss with a consultant microbiologist.

Antibiotic - 1st line

Benzylpenicillin 1.2g IV 6 hourly

PLUS

Flucloxacillin 1g IV 6 hourly for 48-72 hours

Oral switch:

Flucloxacillin 1g orally 6 hourly

Duration of therapy - 5 days

2nd Line / Penicillin Allergy

Clarithromycin 500mg IV 12 hourly for 48-72 hours

Oral switch

Clarithromycin 500mg orally 12 hourly

Duration of therapy - 5 days

4.1.7.7 HUMAN/ANIMAL BITES

Human/Animal Bites

COMMON PATHOGENS

Human oral flora listed in oral infections &
Prevotella sp.
Bartonella sp.
Steptobacillus sp.
Pasteurella multocida

NB:

For human bites, make sure that the patient is on 'blo24 hourly-borne infection pathway' from A&E (like the needlestick pathway for clinicians) because of the risk of catching Hepatitis C, B or HIV.

Antibiotic - 1st line

Co-amoxiclav 625mg PO 8 hourly

Duration of therapy - 5 days

2nd Line / Penicillin Allergy

Doxycycline 100mg PO 12 hourly

PLUS

Metronidazole 400mg PO 8 hourly

Duration of therapy - 5 days

4.1.7.8 COMPOUND MANDIBULAR FRACTURES

Compound Mandibular fractures

COMMON PATHOGENS

Human oral flora listen in severe oral infections

NB:

No post-operative antibiotics required.

Antibiotic - 1st line

Chlorhexidine Gluconate 0.2% mouthwash 10mls twice daily, imediately and for up to 6 days.

WITH

Amoxicillin 1g IV 8 hourly

PLUS

Metronidazole 500mg IV 8 hourly until operation and at the induction of anaesthesia.

ADDITIONAL DOSES TO BE GIVEN EVERY 4 HOURS DURING SURGERY.

** FURTHER DOSE TO BE GIVEN AT THE END OF SURGERY IF >4 HOURS SINCE LAST DOSE.

2nd Line / Penicillin Allergy

Chlorhexidine Gluconate 0.2% mouthwash 10mls twice daily, imediately and for up to 6 days.

WITH

Clarithromycin 500mg IV 12 hourly

PLUS

Metronidazole 500mg IV 8 hourly until operation and at the induction of anaesthesia.

ADDITIONAL DOSES TO BE GIVEN EVERY 4 HOURS DURING SURGERY.

** FURTHER DOSE TO BE GIVEN AT THE END OF SURGERY IF >4 HOURS SINCE LAST DOSE.

4.1.7.9 ZYGOMATIC COMPLEX FRACTURES & ORBITAL FRACTURES REQUIRING INSERTION OF PLATE OR ORBITAL IMPLANT

Zygomatic complex fractures & Orbital fractures requiring insertion of plate or orbital implant

COMMON PATHOGENS

Human oral flora listen in severe oral infections

NB:

Pre-surgery no antibiotics are indicated.

Additional doses to be fiven every 4 hours during surgery.

No post-operative antibiotics required.

Antibiotic - 1st line

Chlorhexidine Gluconate 0.2% mouthwash 10mls twice daily, imediately and for up to 6 days.

On induction of anaesthesia

Amoxicillin 1g IV

PLUS

Metronidazole 500mg IV

2nd Line / Penicillin Allergy

Chlorhexidine Gluconate 0.2% mouthwash 10mls twice daily, imediately and for up to 6 days.

On induction of anaesthesia

Clarithromycin 500mg IV

PLUS

Metronidazole 500mg IV

4.1.7.10 COMPOUND MID-FACE FRACTURES - LEFORT/SINUS

Compund mid-face Fractures LeFort/Sinus

COMMON PATHOGENS

Human oral flora listen in severe oral infections

NB:

Pre-surgery no antibiotics are indicated.

Additional doses to be fiven every 4 hours during surgery.

No post-operative antibiotics required.

Antibiotic - 1st line

Chlorhexidine Gluconate 0.2% mouthwash 10mls twice daily, imediately and for up to 6 days.

On induction of anaesthesia

Amoxicillin 1g IV

PLUS

Metronidazole 500mg IV

2nd Line / Penicillin Allergy

Chlorhexidine Gluconate 0.2% mouthwash 10mls twice daily, imediately and for up to 6 days.

On induction of anaesthesia

Clarithromycin 500mg IV

PLUS

Metronidazole 500mg IV

4.1.7.11 COMPOUND FRONTAL SINUS FRACTURES

Compund Frontal Sinus Fractures

COMMON PATHOGENS

Human oral flora listen in severe oral infections

NB:

Pre-surgery no antibiotics are indicated.

Additional doses to be given every 4 hours during surgery.

If CSF leak, give, Amoxicillin 1-2g IV 6 hourly

PLUS

Flucloxacillin 1-2g IV 6 hourly

Consult microbiology for penicillin allergic patients.

Antibiotic - 1st line

On induction of anaesthesia

Amoxicillin 1g IV

PLUS

Metronidazole 500mg IV

2nd Line / Penicillin Allergy

On induction of anaesthesia

Clarithromycin 500mg IV

PLUS

Metronidazole 500mg IV

4.1.7.12 INCISION AND DRAINAGE OF DENTAL ABSCESS

Incision and drainage of dental abscess

Most **drained abscesses** do not require antibiotics. If there are signs of spreading infection, or systemic illness treat as "severe oral infection" above.

Send pus/swab to Microbiology.

Give 48 hours IV then 3 days oral antibiotics post-op, as per community acquired or hospital acquired above.

4.1.7.13 ANTIBIOTIC PROPHYLAXIS INCLUDING TETANUS

See **Tetanus Prophylaxis in Max Fax Surgery**

4.1.7.14 DENTOALVEOLAR INJURY

Dentoalveolar surgery

Third Molar surgical removal does not require antibiotics unless acutely infected.

Apicetomies do not require antibiotics unless acutely infected.

If acutely infected or bone removal done, use Chlorhexidine Gluconate 10mls of 0.2% mouth wash pre-operatively and treat be grade of the infection as above.

4.1.8 SKIN AND SOFT TISSUE

4.1.8.1 WHEN TO SEND SPECIMENS TO MICROBIOLOGY

Send Microbiological specimens

- If wound is weeping pus/serous fluid send swab for culture and sensitivity
- Blood culture if signs of systemic sepsis
- Gangrene/necrotising fasciitis/abscess: send tissue or aspirate

4.1.8.2 MRSA DECOLONISATION TREATMENT

Treatment of MRSA infections

If there are any MRSA infections in body systems NOT included within this policy, please discuss with Consultant Microbiologist

MRSA Skin decolonisations regimens

Please refer to Trust MRSA Policy

The aim is not to eradicate, but to reduce the MRSA bio-burden to such a level that the cycle of colonisation to infection is prevented for the individual patient. Bio-burden reduction will also reduce patient-to-patient transmission of MRSA.

The use of this regimen without the removal of IV lines or urinary catheters will reduce the success.
Use Octenisan body wash and Mupirocin Nasal ointment concurrently for 5 days

OctenisanÂ®

Bathe daily for 5 days. Use as a shampoo twice in 5 days.

For washing, apply OctenisanÂ® undiluted to a damp washcloth, rub onto the areas of the body to be cleansed with special attention to the axillae, groins and perineum, and any other areas with known carriage (contact time 3 minutes) and wash off.

For showering or hair washing, simply use OctenisanÂ® antimicrobial wash lotion in the same way as other hair and skin washing preparations.

Always observe the recommended contact time of **3** minutes.

For patients with exfoliative skin conditions - REFER TO DERMATOLOGIST

Mupirocin

Apply Mupirocin 2% nasal ointment to inner surface of each nostril using a cotton wool bud or fingers three times a day for 5 days. The nostrils should be closed by pinching the sides of the nose together at each application (to spread the ointment throughout the nares).
Because of emerging problems of MRSA resistance to Mupirocin it is important that a course of Mupirocin is not repeated within a month.

The presence of a Naso-gastric (NG) tube will reduce the efficacy.

If Mupirocin 2% unavailable, alternatives include:

SECOND LINE	Naseptin**Â®** cream	Apply four times daily for 10 days	**NOT appropriate** for patients who have an allergy to peanuts (or nuts) or Chlorhexidine
THIRD	Prontoderm**Â®**	Apply three times	**USE** for patients with an allergy to peanuts (or nuts) or

LINE	Nasal Gel	daily for 5 days	Chlorhexidine

4.1.8.3 CELLULITIS

Cellulitis

- Without systemic signs (PO therapy)
- With systemic signs (IV â† PO therapy)
- Hospital acquired with risk of MRSA (See separate MRSA section in "Useful Tools")

COMMON PATHOGENS

Streptococcus pyogenes (Group A Streptococcus)
Staphylococcus aureus
Occasionally Group C or G Streptococcus

NB:

Benzylpenicillin is NO LONGER indicated in combination with Flucloxacillin providing the dose of Flucloxacillin is â‰¥ 1g IV/PO 6 hourly

Antibiotic - 1st Line

Flucloxacillin 1g IV/PO 6 hourly

Review after 48 hours and step down to oral therapy once margin of cellulitis begins to recede

See CHORAL guidelines.

Duration of therapy 5 - 7 days then review

2nd Line or Penicillin allergy

Clindamycin 450mg orally or 600mg IV 6 hourly

Review after 48 hours and step down to oral therapy once margin of cellulitis begins to recede

See CHORAL guidelines page 61

Duration of therapy 5 - 7 days then review

4.1.8.4 PERIPHERAL IV CANNULA INFECTION

Peripheral IV Canulla Infection

Microbe: Staphylococcus aureus

Occasionally MRSA (suspect if colonised, high risk)

First line

Flucloxacillin 1g IV/PO 6 hourly Duration of therapy 5-7 days, longer if bacteraemic

4.1.8.5 CELLULITIS - OPAT

Cellulitis - OPAT

Appropriate for OPAT (Outpatient Antibiotic Therapy)

Contact OPAT nurse on bleep 453 for assessment and to facilitate discharge

Monday - Friday 8:00am - 4:00pm

OR

Integrated Care Pathway for class 2 cellulitis can be found on OLi

First line

Teicoplanin - see protocol for dosing schedule

Second line / Alternative

Teicoplanin - see protocol for dosing schedule

4.1.8.6 LEG ULCERS / PRESSURE SORES - NON DIABETIC

Leg ulcers and pressure sores - NON DIABETIC

- Avoid antibiotics
- Use local cleansing and topical antiseptics if required.
- Involve Vascular Specialist Nurse for lower limb cellulitis and leg ulcers
- Involve Tissue Viability Nurse for pressure ulcers and other wounds
- If cellulitis/fever â€“ treat based on culture and sensitivity results

4.1.8.7 DIABETIC FOOT INFECTION

4.1.8.7.1 SUPERFICIAL ULCER / BLISTER

Superficial Ulcer / Blister

with no heat or surrounding inflammation

Notify emergency admission or referral to Diabetic Foot and Wound Care Team on 'Hot Foot Line' 07866684362 - currently answer machine on weekends and nights - team will follow up on next working day.

NB:

If MRSA colonised/high risk, please refer to 'Managing MRSA' section

Refer - diabetic foot team unless healed within 4 weeks

Common infecting pathogens: COLONISING SKIN FLORA

Antibiotic - 1st Line

No antibacterial therapy indicated.

Cleansing & topical antiseptics as advised by tissue viability team, Podiatry or diabetic foot clinic

4.1.8.7.2 ULCER WITH CELLULITIS

Ulcer With Cellulitis

Signs of superficial inflammation **OR wound penetrating to tendon or capsule or lymphangitis or systemic effects or "localised infection" not responding to treatment.**

NB:

Ulcer swabs only if pus or initial treatment failed

Blood cultures if systemic effects; soft tissue biopsy in ulcers; ulcer swabs deep as possible

Review after 48 hours and change to oral, guided by sensitivities and clinical examination

Refer - diabetic foot team immediately

Common Pathogens: STAPHYLOCOCCUS AUREUS, STREP. GROUP A, OCCASIONALLY GROUP B AND COLIFORMS

Antibiotic - 1st Line

Flucloxacillin 500mg - 1g orally 6 hourly

Duration of therapy 2 weeks

If known MRSA infection give: Doxycycline 100mg orally 12 hourly

2nd Line or Penicillin allergy

Clindamycin 300-450mg orally 6 hourly

Duration of therapy 2 weeks

If known MRSA infection give: Doxycycline 100mg orally 12 hourly

4.1.8.7.3 DEEP ULCER WITH CELLULITIS

Deep Ulcer With Cellulitis

Penetrating to bone or joint +/- X-Ray or MR or bone scan evidence of osteomyelitis

NB:

Blood cultures if systemic effects; bone biopsy (whenever possible); deep soft tissue biopsy; deep soft tissue swaps (of limited use)

Ceftaroline can be considered but must be approved for use by a Consultant Microbiologist

Common Pathogens: STAPHYLOCOCCUS AUREUS. POSSIBLY POLYMICROBIAL.

Antibiotic - 1st Line

Flucloxacillin 1g IV 6 hourly

PLUS

Gentamicin* (See "Gentamicin dosing and monitoring" in the "Useful Tools" section of the formulary for dosing recommendations and monitoring)

Review at 48 hours.

For Oral step down, refer to sensitivities.

IF NO SENSITIVITIES AVAILABLE - **Diabetic foot clinic will determine duration of therapy.**

If known MRSA infection give:

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily

OR

Doxycycline 100mg orally 12 hourly

Duration of therapy 4-6 weeks

2nd Line or Penicillin allergy

Clindamycin 600mg IV 6 hourly

PLUS

Gentamicin* (See "Gentamicin dosing and monitoring" in the "Useful Tools" section of the formulary for dosing recommendations and monitoring)

Review at 48 hours.

For Oral step down, refer to sensitivities.

IF NO SENSITIVITIES AVAILABLE - **Diabetic foot clinic will determine duration of therapy.**

If known MRSA infection give:

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily

OR

Doxycycline 100mg orally 12 hourly (unless resistant)

Duration of therapy 4-6 weeks

4.1.8.7.4 SEVERE NECROSIS / GANGRENE

Severe Necrosis / Gangrene

NB:

Admit as an emergency.

Inform Diabetic Foot / Vascular team urgently and vascular team out of hours.

Clindamycin has additional Group A Strep toxin blocking action.

Common Pathogens - GROUP A STREPTOCOCCUS,

Antibiotic - 1st Line

Clindamycin 1.2g IV 6 hourly

PLUS

Benzylpenicillin 2.4g IV 6 hourly

PLUS

Gentamicin*

Review at 48 hours

Second Line / Alternative

Clindamycin 1.2g IV 6 hourly

PLUS

Gentamicin*

Review at 48 hours

4.1.8.8 BITES - ANIMAL

Animal Bites

NB:

Topical cleansing, irrigation and debridement as indicated

Is tetanus immunisation up-to-date?

Exotic animals - seek advice from Consultant microbiologist

COMMON PATHOGENS

P. multocida
Capnocytophaga
Staphylococcus aureus

Antibiotic - 1st Line

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy - 5 to 10 days DEPENDING ON CLINICAL RESPONSE

2nd Line or Penicillin allergy

Doxycycline 100mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

Total duration of therapy - 5 days

4.1.8.9 BITES - HUMAN

Human Bites

NB:

Is Hepatitis B vaccination required?

COMMON PATHOGENS

Strep, Peptostrep,
Bacteroides
Staphylococcus aureus

Antibiotic - 1st Line

Co-amoxiclav 625mg orally 8 hourly

Total duration of therapy - 5 days

2nd Line or Penicillin allergy

Doxycycline 100mg orally 12 hourly

PLUS

Metronidazole 400mg orally 8 hourly

Total duration of therapy - 5 days

4.1.8.10 IMPETIGO

Impetigo

NB:

Fusidic acid cream must **ONLY** be used for the treatment of Impetigo. All other indications are **NON-FORMULARY.**

COMMON PATHOGENS

Staphylococcus aureus
Staphylococcus pyogenes

Antibiotic - 1st Line

Fusidic acid cream

Apply topically 3 â€“ 4 times daily for 7 days

If widespread: Flucloxacillin 500mg orally 6 hourly **for 5 days**

Second line or Penicillin allergy

Clarithromycin 500mg orally 12 hourly **for 5 days**

4.1.8.11 NECROTISING FASCIITIS

Necrotising Fasciitis

NB:

ADMIT TO A SIDE ROOM

Patient needs URGENT surgical assessment for tissue debridement.

Clindamycin has additional Group A Strep toxin blocking action.

COMMON PATHOGENS

Grp A Strept.

Staphylococcus aureus.

Antibiotic - 1st Line

Clindamycin 1.2g IV 6 hourly

PLUS

Benzylpenicillin 2.4g IV 6 hourly

PLUS

Gentamicin (See â€œOnce daily gentamicin monitoringâ€• section of the formulary for dose calculation/ monitoring)

Review at 48 hours

2nd Line or Penicillin allergy

Clindamycin 1.2g IV 6 hourly

PLUS

Gentamicin (See â€œOnce daily gentamicin monitoringâ€• section of the formulary for dose calculation/ monitoring)

Review at 48 hours

4.1.9 CENTRAL NERVOUS SYSTEM

4.1.9.1 MENINGITIS: INITIAL BLIND THERAPY

Meningitis: Initial blind therapy

Dexamethasone phosphate 10mg IV 6 hourly for 4 days started with or just before the first dose of antibiotics **but can be given for up to 12 hours after starting antibiotics**

(Note - Always prescribe as **DEXAMETHASONE** phosphate)

(**4mg** Dexamethasone phosphate is equivalent to 3.3mg Dexamethasone sodium phospohate)

DO NOT give Dexamethasone if non-blanching rash is present, ie, possible meningococcal septicaemia

Caution: *Dexamethasone* MAY REDUCE PENETRATION OF *Vancomycin* INTO THE THE CEREBROSPINAL FLUID

In patients with no identified pathogen who have recovered **BY DAY 10 TREATMENT CAN BE DISCONTINUED.**

FOR PATIENTS WHO HAVE RECENTLY COME FROM A COUNTRY (IN LAST 6 MONTHS) WHERE PENICILLIN RESISTANT STREP PNEUMONIAE IS PREVALENT REFER TO SEPERATE GUIDELINE BELOW.

IMPORTANT

Meningitis is a notifiable disease - contact PHE North West or via Hospital switchboard out of hours

NB:

ALL suspected cases of meningitis â†' discussion with Consultant Microbiologist if required.

Viral meningitis does not require treatment with antibiotics or antivirals

Microbiological Samples:
- CSF after CAT/MRI
- Blood culture
- Throat swab for meningococci
- Urine for pneumococcal antigen
- EDTA Blood for meningococcal PCR
- Serology viruses/cryptococci as appropriate

Common pathogens:
Streptococcus pneumoniae
Neisseria meningitidis
Haemophilus influenzae
Listeria monocytogenes

Antibiotic - 1st Line

Ceftriaxone 2g IV 12 houly

Add in:

Amoxicillin 2g IV 4 hourly if high risk of Listeria e.g. immunocompromised / pregnant / elderly

2nd Line or Penicillin allergy

Chloramphenicol 25mg/kg IV 6 hourly (maximum 2g 6 hourly)

Review at 48 hours, if improving reduce dose to 12.5mg/kg IV 6 hourly

Refer to Chloramphenicol dosing table

Add in:

Co-Trimoxazole 120 mg/kg daily in 4 divided doses

Refer to Co-Trimoxazole dosing table

Recent Travel - Penicillin resistant Strep Pneumoniae

If patient comes from country (in last 6 months) where Penicillin resistant Strep Pneumoniae is prevalent e.g:

Canada, China, Croatia, Greece, Italy, Mexico, Pakistan, Poland, Spain, Turkey, USA.

Antibiotic - 1st Line

Ceftriaxone 2g IV 12 hourly

AND

Vancomycin IV (see monitoring guidelines for dosing)

OR

Rifampicin 600mg orally or IV twice daily

2nd Line or Penicillin allergy

Chloramphenicol 25mg/kg IV 6 hourly (maximum 2g 6 hourly)

Review at 48 hours, if improving reduce dose to 12.5mg/kg IV 6 hourly

Refer to Chloramphenicol dosing table

4.1.9.2 MENINGITIS: MENINGOCOCCI

Meningitis caused by meningococci

IMPORTANT

Meningitis is a notifiable disease - Contact Microbiologist/ Public Health England for advice regarding contact tracing.

PHE North West Tel: 03442250562 or via Hospital switchboard out of hours

Give Ciprofloxacin to contacts for eradication of carrier state (BNF for dosing).

Antibiotic - 1st Line

Ceftriaxone 2g IV 12 hourly

OR

Benzylpenicillin 2.4g IV 4 hourly

Duration of therapy 5-7 days

For patients with confirmed meningococcal meningitis who have recovered by day 5 treatment can be stopped

If the patient is not treated with ceftriaxone, **a single dose of 500 mg Ciprofloxacin orally should also be given to eradicate carriage**

2nd Line (Penicillin allergy)

Chloramphenicol 25mg/kg IV 6 hourly (maximum 2g 6 hourly)

Review at 48 hours, if improving reduce dose to 12.5mg/kg IV 6 hourly

Refer to Chloramphenicol **dosing table**

Duration of therapy 5-7 days

For patients with confirmed meningococcal meningitis who have recovered by day 5 treatment can be stopped

A single dose of 500 mg Ciprofloxacin orally should also be given to eradicate carriage

4.1.9.3 MENINGITIS: PNEUMOCOCCI

Meningitis caused by Pneumococci of unknown susceptibility or **penicillin resistant cephalosporin sensitive**

Antibiotic - 1st Line

Ceftriaxone 2g IV 12 hourly

Duration of therapy 10-14 days

2nd Line or Penicillin allergy

Chloramphenicol 25mg/kg IV 6 hourly (maximum 2g 6 hourly

Review at 48 hours, if improving reduce dose to 12.5mg/kg IV 6 hourly

Refer to Chloramphenicol

Duration of therapy 10â€“14 days

Penicillin susceptible Pneumococci

Antibiotic - 1st Line

Benzylpenicillin 2.4g IV 4 hourly

OR

Ceftriaxone 2g IV 12 hourly

Duration of therapy 10 â€“ 14 days

2nd Line or Penicillin allergy

Chloramphenicol 25mg/kg IV 6 hourly (maximum 2g 6 hourly)

Review at 48 hours, if improving reduce dose to 12.5mg/kg IV 6 hourly

Refer to Chloramphenicol dosing table

Duration of therapy 10 â€“ 14 days

Pneumococci non-susceptible to penicillin and cephalosporin

Antibiotic - 1st Line

Ceftriaxone 2g IV 12 hourly

AND

Vancomycin IV (see monitoring guidelines for dosing)

OR

Ceftriaxone 2g IV 12 hourly

AND

Rifampicin 600mg orally 12 hourly if pneumococcal penicillin resistance confirmed

Duration of therapy 10 - 14 days

2nd Line or **Penicillin or cephalosporin anaphylaxis**

Chloramphenicol 25mg/kg IV 6 hourly (maximum 2g 6 hourly)

Review at 48 hours, if improving reduce dose to 12.5mg/kg IV 6 hourly

Refer to Chloramphenicol dosing table

Duration of therapy 10 â€“ 14 days

4.1.9.4 MENINGITIS: HAEMOPHILUS INFLUENZAE

Meningitis caused by Haemophilus influenzae

Antibiotic - 1st Line

Ceftriaxone 2g IV 12 hourly

Duration of therapy 10 days

Second Line / Alternative

Chloramphenicol 25mg/kg IV 6 hourly (maximum 2g 6 hourly)

Review at 48 hours, if improving reduce dose to 12.5mg/kg IV 6 hourly

Refer to Chloramphenicol dosing table

Duration of therapy 10 days

4.1.9.5 MENINGITIS: LISTERIA

Meningitis caused by Listeria

Antibiotic - 1st Line

Amoxicillin 2g IV 4 hourly

Duration of therapy 21 days

2nd Line (Penicillin allergy)

Co-Trimoxazole 120 mg/kg daily in 4 divided doses

Duration of therapy 21 days

Refer to Chloramphenicol dosing table

4.1.9.6 BRAIN ABSCESS / SUBDURAL EMPYEMA

Brain abscess / Subdural Haematoma / Penetrating Craniocerebral Injuries

Antibiotic - 1st Line

Ceftriaxone 2g IV 12 hourly

plus

Metronidazole IV 500mg 8 hourly ***or*** PO 400mg 8 hourly

Refer to neurosurgery

2nd Line (Penicillin allergy)

Discuss with Consultant Microbiologist

4.1.9.7 ENCEPHALITIS

Encephalitis

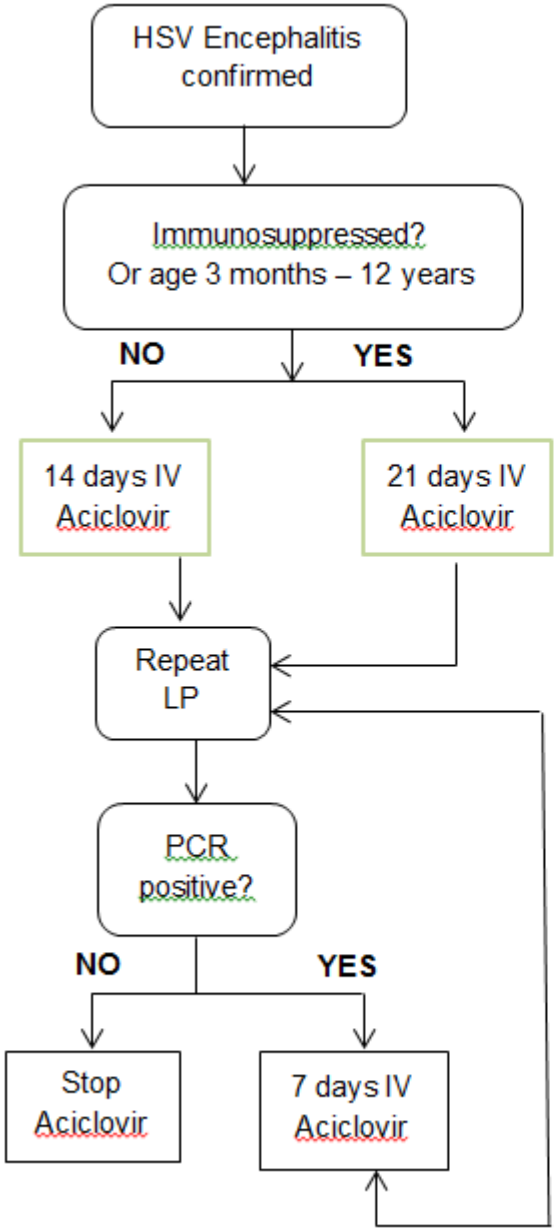
Common Pathogens:

HERPES SIMPLEX

Varicella Zoster

Antibiotic - 1st Line

Aciclovir 10mg/kg IV 8 houly **for at least 14 days** in encephalitis (at least 21 days if also immunocompromised)


HSV Encephalitis confirmed
Immunosuppressed?
Or age 3 months – 12 years
NO
YES
14 days IV Aciclovir
21 days IV Aciclovir
Repeat LP
PCR positive?
NO
YES
Stop Aciclovir
7 days IV Aciclovir

4.1.9.8 VIRAL MENINGITIS

Viral meningitis

Common Pathogens:

Herpes simplex

Enteroviruses

Antibiotic - 1st Line

Antivirals / antibiotics NOT indicated

4.1.9.9 CHLORAMPHENICOL DOSING TABLE

Chloramphenicol dosing table - Meningitis

Chloramphenicol 25mg/kg IV 6 hourly (maximum 2g 6 hourly)

Review at 48 hours, if improving reduce dose to 12.5mg/kg IV 6 hourly

	INITIAL DOSING REGIMEN â€“ DOSE TO BE REDUCED AT 48 HOURS IF PATIENT IMPROVING	DOSE REDUCTION AT 48 HOURS IF PATIENT IMPROVING
Weight (kg)	**Suggested Chloramphenicol 25mg/kg every 6 hours (0600; 1200; 1800; 2400hrs)** **(Doses rounded to nearest 100mg)**	**Suggested Chloramphenicol 12.5mg/kg every 6 hours (0600; 1200; 1800; 2400hrs)** **(Doses rounded to nearest 100mg)**
40	**1000mg**	**500mg**

45	**1100mg**	**600mg**
50	**1300mg**	**600mg**
55	**1400mg**	**700mg**
60	**1500mg**	**800mg**
65	**1600mg**	**800mg**
70	**1800mg**	**900mg**
75	**1900mg**	**900mg**
>80	**2000mg**	**1000mg**

4.1.9.10 CO-TRIMOXAZOLE DOSING TABLE

Co-trimoxazole dosing Table - meningitis

Co-Trimoxazole 120mg/kg daily in 4 divided doses

Weight (kg)	Total daily dose Co-trimoxazole (mg)	Suggested dose Co-trimoxazole (mg) 0600; 1200; 1800; 2400hrs
40	**4800**	**1440; 960; 960; 1440**
45	**5400**	**1440; 1440; 960; 1440**
50	**6000**	**1440; 1440; 1440; 1440**
55	**6600**	**1920; 1440; 1920; 1440**
60	**7200**	**1920; 1920; 1440; 1920**
65	**7800**	**1920; 1920; 1920; 1920**
70	**8400**	**2400; 1920; 2400; 1920**
75	**9000**	**2400; 2400; 1920; 2400**
80	**9600**	**2400; 2400; 2400; 2400**
85	**10,200**	**2880; 2400; 2400; 2400**

4.1.10 GENITAL INFECTIONS

4.1.10.1 COMING SOON!

4.1.11 BONE & JOINT

4.1.11.1 COMPOUND/OPEN FRACTURE PROPHYLAXIS

Compound/Open Fractures

See **Adult Trauma and Orthopaedic Surgery**

4.1.11.2 SEPTIC ARTHRITIS

Septic Arthritis

Clarithromycin should **NOT** be used.

Commonly caused by: STAPHYLOCOCCUS AUREUS

Antibiotic 1st Line

Flucloxacillin 2g IV 4-6 hourly (Flucloxacillin 1g orally 6 hourly)

No evidence for improvement in outcome if Sodium Fusidate used with Flucloxacillin

Duration of therapy 6 weeks

2nd Line / Penicillin Allergy

Clindamycin 600mg IV 6 hourly (Clindamycin 450mg orally 6 hourly)

OR

Teicoplanin 800mg IV 12 hourly for 3 doses then 800mg IV once daily

PLUS either

Sodium fusidate PO 500mg every 8 hours

OR

Rifampicin PO 600mg 12 hourly

4.1.11.3 PROSTHETIC JOINT INFECTIONS

Prosthetic Joint Infections

Consult Microbiologist

4.1.11.4 OSTEOMYELITIS - ACUTE

Osteomyelitis - Acute

Common Pathogen: STAPHYLOCOCCUS AUREUS

Antibiotic 1st Line

Flucloxacillin 2g IV 4-6 hourly (Flucloxacillin 1g orally 6 hourly)

No evidence for improved outcome if Sodium fusidate used with Flucloxacillin

Duration of therapy usually 4-6 weeks

2nd Line / Penicillin Allergy

Clindamycin 600mg IV 6 hourly (Clindamycin 450mg orally 6 hourly)

OR

Teicoplanin 800mg IV 12 hourly for 3 doses then 800mg IV once daily

PLUS either

Sodium fusidate oral 500mg every 8 hours

OR

Rifampicin PO 600mg 12 hourly

4.1.11.5 OSTEOMYELITIS - CHRONIC

Osteomyelitis - Chronic

Common Pathogen: STAPHYLOCOCCUS AUREUS, OCCASIONALLY COLIFORMS

Empiric treatment not indicated.

If acute exacerbation â€“ treat as acute osteomyelitis

Duration of treatment at least 12 weeks

4.1.12 CARDIOVASCULAR

4.1.12.1 ENDOCARDITIS: ACUTE PRESENTATION

Endocarditis - initial "blind" therapy for ACUTE PRESENTATIONS

ALL SUSPECTED CASES OF ENDOCARDITIS MUST BE DISCUSSED WITH MICROBIOLOGISTS AND CARDIOLOGISTS

Microbiological Specimens

- Blood culture. 3 taken if possible at hourly intervals, though 3 samples taken over 1 hour is acceptable in acute endocarditis
- Samples need not be collected when patient is pyrexial as bacteraemia is constant
- Serology for Legionella/Q Fever if blood culture negative endocarditis
- Valve tissue at operation

Common Pathogen: STAPHYLOCOCCUS AUREUS

NB: Specific management MUST be based on sensitivity of organism isolated. Discuss with Consultant Microbiologist.

Vancomycin - Pre-dose 15-20mg/L

Gentamicin Pre-dose <1mg/L // 1 hr Post-dose 3-5mg/L

Antibiotic 1st Line

Flucloxacillin 2g IV 4-6 hourly

PLUS

Gentamicin * 1mg/kg IV 12 hours (modified according to renal function)

2nd Line / Penicillin Allergy

Vancomycin (see monitoring guidelines for dosing)

PLUS

Rifampicin 300 - 600mg PO 12 hourly

4.1.12.2 ENDOCARDITIS: INDOLENT PRESENTATION

Endocarditis - initial "blind" therapy for INDOLENT PRESENTATIONS

ALL SUSPECTED CASES OF ENDOCARDITIS MUST BE DISCUSSED WITH MICROBIOLOGISTS AND CARDIOLOGISTS

Microbiological Specimens

- Blood culture. 3 taken if possible at hourly intervals, though 3 samples taken over 1 hour is acceptable in acute endocarditis
- Samples need not be collected when patient is pyrexial as bacteraemia is constant
- Serology for Legionella/Q Fever if blood culture negative endocarditis
- Valve tissue at operation

Common Pathogen: STREPTOCOCCI

NB: Specific management MUST be based on sensitivity of organism isolated. Discuss with Consultant Microbiologist.

Vancomycin - Pre-dose 15-20mg/L

Gentamicin Pre-dose <1mg/L // 1 hr Post-dose 3-5mg/L

Antibiotic 1st Line

Benzylpenicillin 1.2g IV 4 hourly

PLUS

Gentamicin * 1mg/kg IV 12 hours (modified according to renal function)

2nd Line / Penicillin Allergy

Vancomycin (see monitoring guidelines for dosing)

PLUS

Rifampicin 300 - 600mg PO 12 hourly

4.2 SEPSIS

4.2.1 SEPSIS SCREENING TOOL

AQ Sepsis Screening Tool

4.3 SEPSIS IS A MEDICAL EMERGENCY

Rapid initiation of simple, timely interventions, including antimicrobials and intravenous fluids, can reduce the risk of death by half.

1. Is the EWS score > 0 ?

2. Are two or more of the following present and new to the patient? (SIRS Criteria)

â€¢ WCC < 4 or > 12

â€¢ Temperature <36^{o}C or >38^{o}C

â€¢ Heart Rate > 90min^{-1}

â€¢ Respiratory rate > 20min^{-1} or $PaCO_2$ < 4.2kPa

>>> **score of â‰¤2 meets the SIRS Criteria** <<<

AND / OR

Altered mental state (confused, agitated, reduced GCS)

Blood pressure systolic <90 **or** mean <65 mmHg

3. Is this a new infection? e.g:

Pneumonia, UTI, Peritonitis (Urgent Laparotomy), Meningitis, Cellulitis / Septic Arthritis / Fasciitis / Wound Infection, Endocarditis, Blood Stream infection

4. Are any of the organ dysfunctions below new to the patient?:

Acutely altered mental status (confused, agitated, reduced GCS)

Blood pressure systolic <90 **or** mean <65 mmHg

O_2 saturation <94% on air **or** an oxygen requirement

Creatinine >175Î¼mol/l **or** UO <0.5ml/kg/hr for 2 hrs or AKI

Abnormal LFTs

INR > 1.6

Platelets <100 x 10^9/l

Lactate > 4 mmol/l (>2 abnormal)

4.4 ! ACTION: START THE AQ SEPSIS CARE BUNDLE !

Please refer all cases to Outreach (Bleep 113)

4.4.1 SEPSIS BUNDLE

5 AQ SEPSIS CARE BUNDLE

Advancing Quality SEPSIS CARE BUNDLE

(Attach patient label here)

Hospital No:..... DOB:.....

First Name:..... M / F: ..... Religion: .....

Last name: ..... GP: .....

Address: .....

.....

NHS No: .....

Date of Admission:

.....

Time of Admission:

.....

Time of Diagnosis:

.....

SEPSIS IS A MEDICAL EMERGENCY: ACT NOW. STOP SEPSIS, SAVE LIVES.

	Intervention	Yes	No	If No, Why? (comments)	Date & Time	Signature
	First EWS = (recorded within 60 minutes of arrival)					
	SIRS criteria met and recorded ? (see over for SIRS / Sepsis criteria)					
	Suspected source of infection (record below) eg Pneumonia, UTI etc.					
	Broad spectrum antibiotics given within 1 hour of presentation (prescribe first dose as once only to be given immediately, please record drug and time in comments box)					
	Serum Lactate taken (date /time)					
	Lactate result =					
	Blood Cultures taken (date /time) (Ideally take prior to commencing antibiotics)					
	500ml Plasmalyte over 30 min, if indicated followed by **Further fluid if remains hypotensive or Lactate >4 mmol/l**					
	Oxygen saturations < 94% If Yes start oxygen therapy					
	Fluid Balance Chart commenced and urine output monitored					
	Transfuse Blood if HB<7 &/or Hct<30%					

5.1.1 SEPSIS IN NEUTROPENIC/IMMUNOCOMPROMISED PATIENTS

Neutropenic/Immunocompromised Patients

Discuss all suspected cases of neutropenic sepsis with Haematologists/Oncologists IMMEDIATELY

Contact microbiology for advice if required / Inform acute oncology team Mon-Fri bleep 269

General Principles

Please refer to individual Trust protocols and procedures for Haematology and Oncology
Record Multi-national Association for Supportive Care in Cancer Score daily (MASCC Score â€“ see below)
ANTIBIOTICS MUST BE ADMINISTERED WITHIN ONE HOUR OF ADMISSION TO A&E / HOSPITAL

Treatment of fever or sepsis in ALL neutropenic patients with haematological malignancies AND solid tumours

****Clinical deterioration at any time or unresponsive fever at 3 days should be discussed urgently with a microbiologist****

Neutrophil count
â‰¤0.5 x 109/L or
<1.0 X 109/L but are falling rapidly.
AND
Fever of >38Â°C or 37.5Â°C on 2 measurements 1 hour apart
OR
other signs and symptoms consistent with clinically significant sepsis

Never wait for results before starting IV antibiotics

Common Pathogens

Gram positive pathogens
Gram negative pathogens which can lead to shock, multi- organ failure and death

Antibiotic - 1st line

Piperacillin-tazobactam 4.5g IV 6 hourly

ADD if suspected line infection or known to be colonised with MRSA

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg IV once daily

Review culture and sensitivity results at 48 hours. Oral step down refer to sensitivities

If no sensitivities available:

Co-amoxiclav 625mg orally 8 hourly

****TOTAL duration of therapy (IV and ORAL) 5 days**

2nd line or Penicillin Allergy - NOT Anaphylaxis

Meropenem 1g IV 8 hourly

Review culture and sensitivity results at 48 hours. Oral step down refer to sensitivities

If no sensitivities available:
Ciprofloxacin 750mg orally 12 hourly

EXCEPT in patients who have received Ciprofloxacin as prophylaxis during chemotherapy â€“ in these cases discuss with microbiology.

****Total duration of therapy (IV and ORAL) 5 days**

3nd line or Penicillin Allergy - Anaphylaxis

Teicoplanin 800mg IV 12 hourly for 3 doses then 800mg IV once daily

PLUS

Gentamicin (See â€œOnce daily Gentamicin monitoringâ€• for dose calculation/monitoring)

PLUS

Metronidazole 500mg IV 8 hourly

Review culture and sensitivity results at 48 hours. Oral step down refer to sensitivities

If no sensitivities available:
Ciprofloxacin 750mg orally 12 hourly

EXCEPT in patients who have received Ciprofloxacin as prophylaxis during chemotherapy â€“ in these cases discuss with microbiology.

****Total duration of therapy (IV and ORAL) 5 days**

5.1.2 NEUTROPENIC SEPSIS ALGORITHM

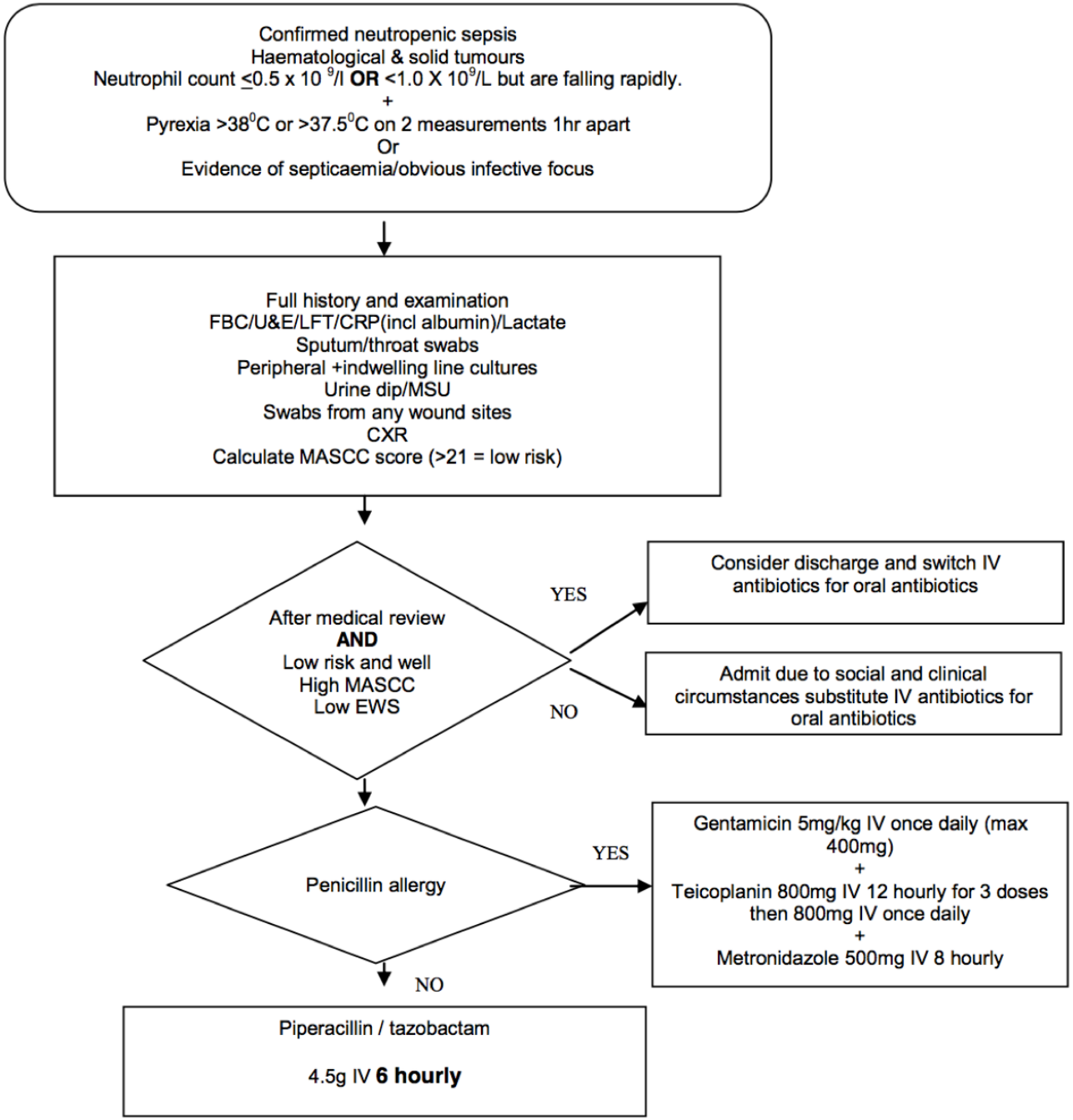
Algorithm for Managing Sepsis in Neutropenic/Immunocompromised patients

Discuss all suspected cases of neutropenic sepsis with Haematologists/Oncologists IMMEDIATELY

Contact microbiology for advice if required / Inform acute oncology team Mon-Fri bleep 269

First dose of antibiotics should be administered within 4 hours of initial patient contact to any healthcare professional **AND** within one hour of admission:

- Admit to side ward and reverse barrier nurse
- Discuss all patients with base oncology team or haematologist on call **IMMEDIATELY**
- Assess performance status including early warning score (EWS) and Multinational Association for Supportive Care in Cancer (MASCC) Score daily


Confirmed neutropenic sepsis
Haematological & solid tumours
Neutrophil count ≤0.5 x 10 9/l OR <1.0 X 10^9/L but are falling rapidly.
+
Pyrexia >38°C or >37.5°C on 2 measurements 1hr apart
Or
Evidence of septicaemia/obvious infective focus
Full history and examination
FBC/U&E/LFT/CRP(incl albumin)/Lactate
Sputum/throat swabs
Peripheral +indwelling line cultures
Urine dip/MSU
Swabs from any wound sites
CXR
Calculate MASCC score (>21 = low risk)
After medical review
AND
Low risk and well
High MASCC
Low EWS
YES
Consider discharge and switch IV antibiotics for oral antibiotics
NO
Admit due to social and clinical circumstances substitute IV antibiotics for oral antibiotics
Penicillin allergy
YES
Gentamicin 5mg/kg IV once daily (max 400mg)
+
Teicoplanin 800mg IV 12 hourly for 3 doses then 800mg IV once daily
+
Metronidazole 500mg IV 8 hourly
NO
Piperacillin / tazobactam
4.5g IV 6 hourly

MASCC Score	
Characteristic	**Score**
No or mild symptoms **OR** Moderate symptoms	5 **OR** 3
Normotensive (systolic >100 mmHg)	5
No history of COPD	4
Solid tumour or no previous fungal infection if haematological	4
No dehydration	3
Outpatient at fever onset	3
Age< 60 years	2
Total Score (21 or more = low risk)	
The maximum theoretical score is 26	

5.1.3 SEPTICAEMIA OF UNKNOWN ORIGIN

Septicaemia of Unknown origin

Microbiological Specimens

Blood culture 2-3 samples
For line infection blood cultures should be taken both peripherally and from all lines
Line tips should be sent if infected line is removed
Other samples as indicated under specific organ system investigations

General principles

Relevant for patients that are not neutropenic

Must have diagnosed organ dysfunction with â‰¥2 of the following:

WCC < 4 or > 12 x 109/L Temp < 36Â°C or > 38Â°C Heart rate > 90bpm Respiratory rate > 20/min or PaCO2 < 4.3kPa

Refer to Trust Guidelines and pathway Sepsis

Antibiotic - 1st Line

Amoxicillin 1g IV 8 hourly

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See â€œOnce daily Gentamicin monitoringâ€• for dose calculation/monitoring)

MRSA colonised /suspected:

Change Amoxicillin to: Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily.

Review at 48 hours.

Second Line / Penicillin Allergy

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily.

PLUS

Metronidazole 500mg IV 8 hourly

PLUS

Gentamicin (See â€œOnce daily gentamicin monitoringâ€• for dose calculation/monitoring)

Review at 48 hours.

5.2 SURGICAL PROPHYLAXIS

5.2.1 GENERAL PRINCIPLES OF ANTIBIOTIC PROPHYLAXIS

General Principles of Antibiotic Prophylaxis

The final decision regarding the benefits and risks of prophylaxis for an individual patient will depend on:

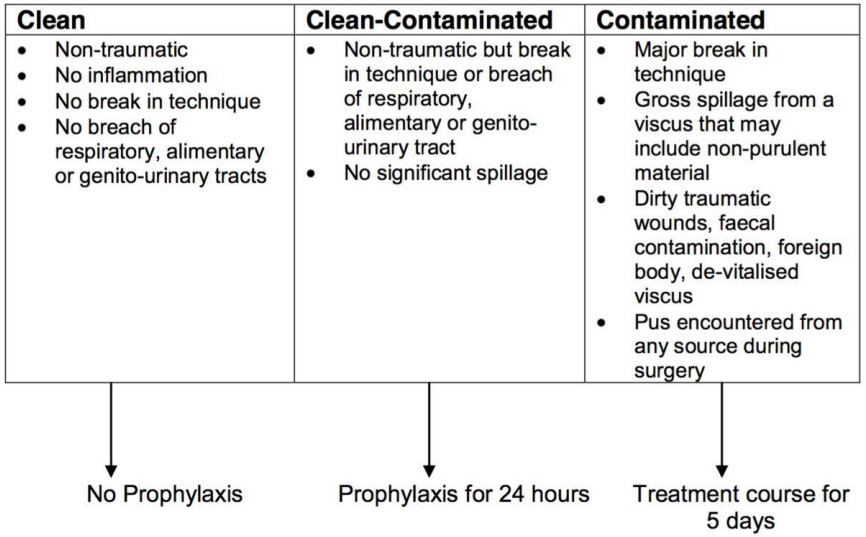
- The patientâ€™s risk of Surgical Site Infection (SSI)
- The potential severity of the consequences of SSI
- The effectiveness of prophylaxis for the procedure
- The consequences of prophylaxis for that patient (for example, increased risk of colitis)

Antibiotic choices and dosing

Antibiotic prophylaxis is not routinely required for clean non-prosthetic uncomplicated surgery. Antibiotic prophylaxis is required for clean surgery involving the placement of a prosthesis or implant, clean-contaminated surgery, and contaminated surgery

- The antibiotics selected for prophylaxis must cover the expected pathogens for the operative site
- The choice of antibiotic should take into account local resistance patterns
- Narrow spectrum, less expensive antibiotics should be the first choice of prophylaxis during surgery

Where prosthesis is not involved the surgery may simply be classified as Clean, Clean-Contaminated or Contaminated. One dose of antibiotics is usually adequate for clean contaminated surgery, and there is certainly no benefit in prolonging antibiotics beyond 24 hours, after which antibiotic associated risks increase. For contaminated surgery, a 5 day **treatment** course may be required.



Timing of administration

The aim of prophylaxis is to have maximum tissue levels at the time of first incision (the only exception is where microbiological specimens are to be taken, in which case prophylaxis should be given immediately after specimens have been obtained).

For this reason, oral and intramuscular prophylaxis is usually administered 1 hour pre-op, whereas intravenous antibiotics are given so that the infusion or dose has just been completed at the time of incision.

Duration of Prophylaxis

A single dose of antibiotic with a long enough half-life to achieve activity throughout the operation is recommended For operations lasting more than 4 hours re-dosing may be necessary depending on the antibiotics used.

In the event of major intraoperative blood loss in adults (>1,500mL) additional dosage of prophylactic antibiotic should be considered after fluid replacement.

5.2.2 UPPER GI SURGERY

Upper Gastro-Intestinal Surgery

Procedure	Antibiotic - 1st line	Penicillin allergy â€“ non anaphylaxis	MRSA positive or Penicillin allergy - anaphylaxis	Dose timing
Gastric / Oesophageal Surgery	Gentamicin 3mg/kg IV			1 dose at induction
Laparoscopic cholecystectomy	**Prophylaxis is not recommended** Antibiotic prophylaxis should be considered in high risk patients. (high risk: intraoperative cholangiogram, bile spillage, conversion to laparotomy, acute cholecystitis/pancreatitis, jaundice, pregnancy, immunosupression, insertion of prosthetic devices) **If required give: Gentamicin 3mg/kg IV (Use ideal body weight)** **PLUS** **Metronidazole 500mg IV**			1 dose at induction
Hemihepatectomy **Whipple Surgery**	Gentamicin 3mg/kg IV (Use ideal body weight) **PLUS**			1 dose at induction

	Metronidazole 500mg I/V		
Open biliary tract surgery	Gentamicin 3mg/kg IV (Use ideal body weight) **PLUS** Metronidazole 500mg I/V		1 dose at induction
Endoscopic retrograde cholangiopancreatography (ERCP) when complete biliary drainage unlikely to be achieved **(e.g., sclerosing cholangitis and/or hilar** **cholangiocarcinoma)**	Gentamicin 3mg/kg IV (Use ideal body weight)		1 dose at induction
Hernia repair	**Prophylaxis is not recommended**		
Hernia repair with mesh	Flucloxacillin 1g IV	Teicoplanin 400 mg IV	1 dose at induction
Splenectomy	**Prophylaxis is not recommended**		

5.2.3 LOWER GI SURGERY

Lower Gastro-Intestinal Surgery

Procedure	**Antibiotic - 1st line**	**Penicillin allergy**	**MRSA positive**	**Dose timing**
Colorectal Surgery	Gentamicin 3mg/kg IV (Use ideal body weight) **PLUS**			1 dose at induction

	Metronidazole 500mg I/V		
Appendicectomy	Gentamicin 3mg/kg IV (Use ideal body weight) **PLUS** Metronidazole 500mg IV (Use ideal body weight)		1 dose at induction
Gangrenous /ruptured appendix	Amoxicillin 1g IV **PLUS** Gentamicin 3mg/kg I/V **PLUS** Metronidazole 500mg I/V	Teicoplanin 800mg IV **PLUS** Gentamicin 3mg/kg IV (Use ideal body weight) **PLUS** Metronidazole 500mg IV	**Start treatment at presentation and continue for 5 days** Discuss with microbiology if oral step down required for discharge

5.2.4 ADULT TRAUMA AND ORTHOPAEDIC SURGERY

Adult Trauma and Orthopaedic Surgery

NB* IF SURGERY LONGER THAN 4 HOURS, REPEAT FLUCLOXACILLIN DOSE. IF BLOOD LOSS MORE THAN 1.5 LITRES, REPEAT ALL ANTIBIOTIC DOSES AFTER FLUID REPLACEMENT.

Procedure	**Antibiotic - 1st line**	**Penicillin allergy**	**MRSA positive**	**Dose timing**
Arthroscopy	**Prophylaxis is not recommended**			
Arthroplasty	Teicoplanin 400mg IV	Teicoplanin 400mg IV		**1 dose at induction**

	PLUS Gentamicin 3mg/kg (Use ideal body weight)	**PLUS** Gentamicin 3mg/kg (Use ideal body weight)	+ Gentamicin-loaded cement
Hip and Knee Revision Arthroplasty **For non-infective revisions**.	Teicoplanin 400mg IV **PLUS** Gentamicin 3mg/kg (Use ideal body weight)	Teicoplanin 400mg IV **PLUS** Gentamicin 3mg/kg (Use ideal body weight)	**1 dose at induction** + Gentamicin-loaded cement
Infected Joint Prosthesis	**Discuss treatment with Consultant Microbiologist**		
Other Orthopaedic implant surgery	Teicoplanin 400mg IV **PLUS** Gentamicin 3mg/kg (Use ideal body weight)	Teicoplanin 400mg IV **PLUS** Gentamicin 3mg/kg (Use ideal body weight)	**1 dose at induction**
Open fractures	Flucloxacillin 1g 6 hourly IV **PLUS** Gentamicin 3mg/kg once daily IV (Use ideal body weight)	Teicoplanin 400mg IV **PLUS** Gentamicin 3mg/kg IV once daily (Use ideal body weight)	Continue antibiotics for 72 hours after initial debridement or until definitive wound closure, whichever is sooner. Teicoplanin loading dose is 12

	PLUS **If wound is contaminated** Metronidazole 500mg 8 hourly IV	**PLUS** **If wound is contaminated** Metronidazole 500mg 8 hourly IV	hourly for 3 doses, then once daily Check Tetanus vaccine history.
Open surgery for closed fractures	Flucloxacillin 1g IV **PLUS** Gentamicin 3mg/kg once daily IV (Use ideal body weight)	Teicoplanin 400mg IV **PLUS** Gentamicin 3mg/kg IV (Use ideal body weight)	**1 dose at induction**
EMERGENCY major procedures â€“ involving metalwork, including joint, pelvic or spinal implants	Flucloxacillin 1g IV **PLUS** Gentamicin 3mg/kg IV (Use ideal body weight) **PLUS** **If wound is contaminated** **Metronidazole 500mg IV**	Teicoplanin 400mg IV **PLUS** Gentamicin 3mg/kg IV (Use ideal body weight) **PLUS** **If wound is contaminated** **Metronidazole 500mg IV**	**1 dose at induction**

5.2.5 VASCULAR SURGERY

Vascular Surgery

DISTAL LIMB SURGERY - ANTIBIOTICS SHOULD BE ADMINISTERED AT LEAST 15 MINUTES PRIOR TO INFLATION OF TOURNIQUET I.E. BEFORE INDUCTION OF ANAESTHESIA. ANTIBIOTIC PROPHYLAXIS FOR BACTERIA ENDOCARDITIS IN ORTHOPAEDIC AND VASCULAR IMPANTS IS NOT RECOMMENDED BY NICE GUIDELINES.

Procedure	**Antibiotic - 1st line**	**Penicillin allergy â€“ non anaphylaxis**	**MRSA positive or Penicillin allergy - anaphylaxis**	**Dose timing**
Open AAA/aortic reconstruction (elective or ruptured â€“ all approaches)	Flucloxacillin 1g IV **PLUS** Gentamicin 3 mg/kg IV **PLUS** Metronidazole 500mg IV	Teicoplanin 400 mg IV **PLUS** Gentamicin 3 mg/kg IV **PLUS** Metronidazole 500mg IV		1 dose at induction **ONLY**
Carotid surgery â€“ all	Flucloxacillin 1g IV	Teicoplanin 400 mg IV		1 dose at induction **ONLY**
Other arterial surgery (without presence of sepsis)	Flucloxacillin 1g IV **PLUS** Gentamicin 3 mg/kg IV	Teicoplanin 400 mg IV **PLUS** Gentamicin 3 mg/kg IV		**Consider adding Metronidazole 500mg IV if at risk of anaerobic infection e.g diabetic**
Amputations and arterial reconstruction (in patients with pre-existing open wound, ulcer or ischaemic foot and no specific sensitivities available).	Flucloxacillin 1g IV **PLUS** Gentamicin 3 mg/kg IV **PLUS**	Teicoplanin 400 mg IV **PLUS** Gentamicin 3 mg/kg IV		1 dose at induction unless patient undergoing high level amputation, if so consider giving 2 further doses of Flucloxacillin and Metronidazole post-

	Metronidazole 500mg	**PLUS** Metronidazole 500mg IV	operatively or 2 further dose of Metronidazole if MRSA positive or penicillin allergic
Varicose vein surgery (consider prophylaxis)	Flucloxacillin 1g IV	Teicoplanin 400 mg IV	1 dose at induction **ONLY**
Varicose vein surgery with groin incision or ulcerated veins	Co-amoxiclav 1.2g	Teicoplanin 400 mg IV **PLUS** Gentamicin 3 mg/kg IV **PLUS** Metronidazole 500mg IV	1 dose at induction **ONLY**
Varicose veins sclerotherapy	Prophylaxis **NOT** recommended		
Angiogram or angioplasty	Prophylaxis **NOT** recommended		

5.2.6 UROLOGICAL PROCEDURES

5.2.6.1 ROBOTIC AND RADICAL LAPAROSCOPIC PROSTATECTOMY

Robotic and Radical laparoscopic prostatectomy

Procedure	1st line	Penicillin Allergy	Dose timing / Comments
Robotic or Radical laparoscopic prostatectomy	Piperacillin-tazobactam 4.5g iv	Gentamicin 3mg/kg iv	1 dose immediately prior to procedure **No post-op prophylaxis required**

5.2.7 INTERVENTIONAL RADIOLOGY PROCEDURES

Inteverntional Radiology Procedures

Procedure	Antibiotic - 1st line	MRSA positive or Penicillin allergy - anaphylaxis	Dose Timing
Angiography	**Antibiotics not indicated**		
Angioplasty	**Antibiotics not indicated**		
Arterial Closure Placement Device	**Antibiotics not indicated**		
IVC Filters • Insertion and Removal	**Antibiotics not indicated**		
PICC/Tunnelled central line insertions	**Antibiotics not indicated**		
Vascular Stent Insertion	**Antibiotics not indicated**		
Endo Vascular Repair	Teicoplanin 400mg IV		

(EVAR) **Endograft Placement**		
Embolisation Testicular Vein	**Antibiotics not indicated**	
Radiofrequency Tumour Ablation Renal and Liver	**Antibiotics not indicated**	
Chemoembolisation		
Chemoembolisation (TACE) : Liver tumours.	**Antibiotics not indicated except in patients without an intact sphincter of Oddi** If indicated: Gentamicin 3mg/kg IV (Use ideal body weight - see chart)* PLUS Metronidazole 500mg IV	
Portal vein embolization (PVE):	**Antibiotics not indicated except in patients without an intact sphincter of Oddi** If indicated: Gentamicin 3mg/kg IV (Use ideal body weight - see chart)* PLUS Metronidazole 500mg IV	
Bland embolization:	**Antibiotics not indicated**	
Radiologically Inserted Gastostomy	**Antibiotics not indicated**	
Percutaneous Transhepatic Cholangiogram and Biliary Drainage	**If not already on antibiotics (ensure previous C+S checked on ICE):**	**1 dose immediately prior to procedure**

	Gentamicin 3mg/kg IV (Use ideal body weight â€“ see chart) **PLUS** Metronidazole 500mg IV			
If patient deteriorates following PTC consider starting the following antibiotics â€“ take blood cultures prior to initiation				
	Antibiotic - 1st line	**Penicillin allergy â€“ non-anaphylaxis**	**Penicillin allergy - anaphylaxis**	**Review antibiotics at 48 hours with blood culture results**
	Piperacillin-tazobactam 4.5g IV 8 hourly	Meropenem 1g IV 8 hourly	Ciprofloxacin 400mg IV STAT then 500mg PO 12 hourly **PLUS** Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg once daily **PLUS** Metronidazole 500mg IV 8 hourly	
Nephrostomy • Insertion • Exchange	**If not already on antibiotics (ensure previous C+S checked on ICE):** Gentamicin 3mg/kg IV (Use ideal body weight â€“ see chart) Gentamicin 3mg/kg IV (Use ideal body weight â€“ see chart)			**1 dose immediately prior to procedure**

	Not required if exchange in non-infected urine			
If patient deteriorates following Nephrostomy consider starting the following antibiotics â€“ take blood cultures prior to initiation				
	Antibiotic - 1st line	**Penicillin allergy â€“ non-anaphylaxis**	**Penicillin allergy - anaphylaxis**	**Review antibiotics at 48 hours with blood culture results**
	Piperacillin-tazobactam 4.5g IV 8 hourly	Meropenem 1g IV 8 hourly	Ciprofloxacin 400mg IV STAT then 500mg PO 12 hourly	
Drains and Aspirations, Percutaneous Abscess Drainage	**Drainage alone may be all that is required** Contact Consultant Microbiologist if advice needed			Send sample to microbiology when antibiotics are likely to be used
Ureteric Stent	Gentamicin 3mg/kg IV (Use ideal body weight â€“ see chart)			**1 dose immediately prior to procedure**
Renal Fistulograms	**Antibiotics not indicated**			
Biopsies (Lungs, Liver, Lumps etc)	Antibiotics not indicated unless transrectal (see urology surgical prophylaxis)			

5.2.8 ENDOSCOPY UNIT PROPHYLAXIS

Procedure	**Antibiotic - 1st line**	**2nd line or penicillin allergy**	**Dose timing**
ROUTINE PROPHYLAXIS FOR ERCP IS NOT CONSIDERED APPROPRIATE OUTSIDE THE SPECIFIC CIRCUMSTANCES DESCRIBED BELOW			
Patients with valvular heart disease, valve replacement, and/or surgically constructed systemicâ€“pulmonary shunt or conduit, or vascular graft			

Prophylaxis is not recommended		
ERCP for the following patient groups:		
Ongoing cholangitis or sepsis elsewhere	Be guided by recent culture and sensitivity results. **Patients should already have been established on antibiotics**	
Biliary obstruction and/or common bile duct stones and/or straightforward stent change	Not indicated if Biliary decompression achieved A full course of antibiotics becomes necessary if adequate biliary decompression is not achieved (see below hepato-biliary section of formulary)	
ERCP when complete biliary drainage is not achieved	Gentamicin 3mg/kg IV **OR** Ciprofloxacin 750mg orally	**SINGLE DOSE PROPHYLAXIS** Be guided by recent culture and sensitivity results.
Patient with primary sclerosing cholangitis and strictures OR hilar cholangiocarcinoma cyst OR communicating pancreatic cyst or pseudocyst	Gentamicin 3mg/kg IV **OR** Ciprofloxacin 750mg orally	**SINGLE DOSE PROPHYLAXIS**

Endoscopic ultrasound intervention for the following patient groups:			
Fine needle aspiration solid lesions	**Prophylaxis is not recommended**		
Fine needle aspiration of cystic lesions in or near **pancreas, or drainage of cystic cavity**	Amoxicillin 1g IV **PLUS** Gentamicin 3mg/kg IV **PLUS** Metronidazole 500mg IV	Teicoplanin 800mg IV **PLUS** Gentamicin 3mg/kg IV **PLUS** Metronidazole 500mg IV	**SINGLE DOSE PROPHYLAXIS**
Percutaneous endoscopic gastrostomy (PEG)	Co-amoxiclav 1.2g IV	Clarithromycin 500mg IV **PLUS** Metronidazole 500mg IV 8 hourly	**SINGLE DOSE PROPHYLAXIS**
	Patients already receiving broad spectrum antibiotic do not require additional prophylaxis		
Variceal bleeding	Co-amoxiclav 1.2g IV 8 hourly **Total duration of therapy 3 days**	Teicoplanin 800mg IV **SINGLE DOSE ONLY** **PLUS** Ciprofloxacin 400mg IV 12 hourly	Ciprofloxacin and Metronidazole can be given ORALLY if patient not nil-by-mouth

		PLUS Metronidazole 500mg IV 8 hourly **Total duration of therapy 3 days**	
Profoundly immunocompromised patients (e.g., neutropenia or advanced haematological malignancy	Amoxicillin 1g IV **PLUS** Gentamicin 3mg/kg IV **PLUS** Metronidazole 500mg IV	Teicoplanin 800mg IV **PLUS** Gentamicin 3mg/kg IV **PLUS** Metronidazole 500mg IV	Only indicated in procedures with high risk of bacteraemia (e.g., sclerotherapy, dilatation, ERCP with obstructed system)

5.2.9 EAR NOSE & THROAT SURGERY

Ear, Nose & Throat Surgery

Procedure	**Antibiotic - 1st line**	**Penicillin allergy**	**MRSA positive**	**Dose timing**
Ear surgery **No mucosal breach**	**Prophylaxis is not recommended**			

(clean/clean-contaminated)				
Ear surgery **With mucosal breach** (clean/clean-contaminated)	**Co-amoxiclav 1.2g IV**	**Clindamycin 600mg IV**	**Teicoplanin 400mg IV** **PLUS** **Metronidazole 500mg IV**	**1 dose at induction**
Routine nose, sinus and **endoscopic sinus surgery**				**If active infection review antibiotic sensitivities** **Discuss appropriate antibiotics with microbiology consultant**
Grommet insertion	**Prophylaxis is not recommended**			
Grommet insertion if bleeding or purulent	**Ciprofloxacin ear drops 0.3%** **3 drops into the ear as a single dose**			**No further topical Ciprofloxacin required**
Tonsillectomy	**Prophylaxis is not recommended**			
Adenoidectomy (by curettage)	**Prophylaxis is not recommended**			
Septorhinoplasty (simple/routine)	**Prophylaxis is not recommended**			
Complex septorhinoplasty (including grafts)	**Co-amoxiclav 1.2g IV**	**Clindamycin 600mg IV**	**Teicoplanin 400mg IV** **PLUS** **Metronidazole 500mg IV**	**1 dose at induction**

5.2.10 TETANUS PROPHYLAXIS IN MAX FAX SURGERY

Tetanus Prophylaxis in Oral and Maxillofacial Surgery

Any wound or burn that requires a surgical intervention or when treatment is delayed for more that 6 hrs.
Wounds or burns that show any of the following characteristics: significant degree of devitalised tissue, puncture-type injury (particularly in contact with soil or manure), wounds containing foreign bodies, compound fractures, wounds or burns in patients who have systemic sepsis.

If the wound or burn fulfils the above criteria and is considered to be high risk (heavy contamination with material likely to contain tetanus spores and/or extensive devitalised tissue) then tetanus immunoglobulin (available from the A&E department) should be given for immediate protection irrespective of the tetanus immunisation history. When accepting referrals from other hospitals ensure this has been checked and managed before transfer and written in the notes photocopied for you. Otherwise follow the guidance listed below.

Prevention dose is 250 units by intramuscular injection, or 500 units, if more than 24 hours have elapsed since injury, or there is a risk of heavy contamination.

Specific Anti-Tetanus Prophylaxis

Immunisation Status	**Clean Wound**	**Tetanus-prone wound**	
	Vaccine	**Vaccine**	**Human Tetanus Immunoglobulin**
Fully immunised, i.e. has received a total five doses of vaccine at appropriate	None required	None required	Only if high risk

intervals			
Primary immunisation complete, boosters incomplete but up to date	A reinforced dose of vaccine and further doses as required to complete the recommended schedule (to ensure future immunity)	A reinforced dose of vaccine and further doses as required to complete the recommended schedule (to ensure future immunity)	Yes: one dose of human tetanus immunoglobulin in different site
Not immunised or immunisation status not known or uncertain	An immediate dose of vaccine followed, if records confirm that is needed, by completion of a full 5- day dose course to ensure future immunity	An immediate dose of vaccine followed, if records confirm that is needed, by completion of a full 5- day dose course to ensure future immunity	Yes: one dose of human tetanus immunoglobulin in different site

5.2.11 PACEMAKER INSERTION PROPHYLAXIS

Pacemaker insertion prophylaxis

Pacemaker insertion

Procedure	Antibiotic - 1st line	Penicillin allergy â€“ non anaphylaxis	MRSA positive or Penicillin allergy - anaphylaxis	Dose timing
Pacemaker insertion				

	Teicoplanin 800mg IV **PLUS** 80mg Gentamicin in pocket	1 dose at induction **Further dose of** **Teicoplanin not required**

5.2.12 BREAST SURGERY

Breast Surgery

Procedure	**Antibiotic - 1st line**	**Penicillin allergy â€“ non anaphylaxis**	**MRSA positive or Penicillin allergy - anaphylaxis**	**Dose timing**
Breast cancer surgery **Breast reshaping procedures**	Co-amoxiclav 1.2g IV	Teicoplanin 400mg IV **PLUS** Gentamicin 3mg/kg IV **PLUS**		1 dose at induction

		Metronidazole 500mg IV	
Post mastectomy **Expander/implant breast reconstruction**	Co-amoxiclav 1.2g IV Followed by Co-amoxiclav 625mg 8 hourly if required until drain removed	Teicoplanin 400mg IV **PLUS** Gentamicin 3mg/kg IV **PLUS** Metronidazole 500mg IV Followed by Doxycycline 100mg daily if required until drain removed	1 dose at induction with oral follow on if required when drain is in proximity to implant

5.2.13 OBSTETRIC AND GYNAECOLOGICAL SURGERY

See separate protocols.

Gynaecology Guidelines - G16 Prevention and Treatment of Infection

5.2.14 MAXILLOFACIAL SURGERY

Maxillofacial Surgery

Procedure		**1st line**	**Penicillin Allergy**	**MRSA positive**	**Dose timing / Comments**
Open reduction & internal fixation of fractures (ORIF)	**No prosthesis**	Co-amoxiclav 1.2g IV	Clindamycin 600mg IV	Teicoplanin 400mg IV **PLUS** Metronidazole 500mg IV	**1 dose at induction**
	Insertion of prosthesis	Co-amoxiclav 1.2g IV at induction & 2 further doses at 8 and 16 hours post-op	Clindamycin 600mg IV at induction & 3 further doses at 6, 12 and 18 hours post-op	Teicoplanin 400mg IV at induction **PLUS** Metronidazole 500mg IV at induction & 2 further doses at 8 and 16 hours post-op	
Open fractures for conservative treatment		Co-amoxiclav 625mg orally 8 hourly **Continue antibiotics for 72 hours after initial debridement or until definitive wound closure, whichever is sooner**	Clindamycin 450mg orally 6 hourly **Continue antibiotics for 72 hours after initial debridement or until definitive wound closure, whichever is sooner**	Teicoplanin 400mg IV **PLUS** Metronidazole 400mg orally 8 hourly **Continue antibiotics for 72 hours after initial debridement or until**	Teicoplanin loading dose is 12 hourly for 3 doses, then move to maintenance dose of 400mg od. Check Tetanus vaccine history

				definitive wound closure, whichever is sooner	
Skin / Mucosal Lacerations **(clean)**		**Prophylaxis not recommended**			Check Tetanus status. Good debridement / irrigation essential.
Skin / Mucosal Lacerations **(contaminated/ penetrating)**		Co-amoxiclav 1.2g IV	Clindamycin 600mg IV **PLUS** Gentamicin 3mg/kg IV (use ideal body weight) (Omit Gentamicin if eGFR<30ml/min)	Teicoplanin 400mg IV **PLUS** Metronidazole 500mg IV **PLUS** Gentamicin 3mg/kg IV (use ideal body weight) (Omit Gentamicin if eGFR <30ml/min)	**1 does at induction**
Orthognathic surgery		Co-amoxiclav 1.2g IV at induction & 2 further doses at 8 and 16 hours post-op	Clindamycin 600mg IV at induction & 3 further doses at 6, 12 & 18 hours post-op	Teicoplanin 400mg IV at induction **PLUS** Metronidazole 500mg IV at induction & 8 and 16 hours post-op	
Alveolar bone grafting	**No prosthesis**	Co-amoxiclav 1.2g IV **1 dose at induction**	Clindamycin 600mg IV **1 dose at induction**	Teicoplanin 400mg IV	**ONLY** where limited coverage over a bone graft give 5 days of

(intra-oral)				**PLUS** Metronidazole 500mg IV **1 dose at induction**	oral Co-amoxiclav or oral Clindamycin . Where MRSA positive refer to sensitivities for oral switch, or speak to microbiologist if none published
	Prosthesis insertion	Co-amoxiclav 1.2g IV at induction & 2 further doses at 8 hours & 16 hours post-op	Clindamycin 600mg IV at induction & 3 further doses at 6, 12 & 18 hours post-op	Teicoplanin 400mg IV at induction **PLUS** Metronidazole 500mg IV at induction & 2 further post-op doses of Metronidazole at 8 & 16 hours post-op	
Temporo-mandibular joint surgery	**Clean & no prosthesis**	**Prophylaxis is not recommended**			
	Prosthesis insertion	Co-amoxiclav 1.2g IV at induction & 2 further doses at 8 & 16 hours post-op	Clindamycin 600mg IV at induction & 3 further doses at 6, 12 & 18 hours post-op	Teicoplanin 400mg IV at induction **PLUS** Metronidazole 500mg IV at induction & 2 further post-op doses of Metronidazole 500mg IV at 8 & 16 hours post-op	
Head & Neck surgery **(clean, benign, no mucosal**		**Prophylaxis not recommended**			

breach)					
Head & Neck surgery **(clean-contaminated; malignant; neck dissection; contaminated or penetrating skin or mucosal lacerations)**		Co-amoxiclav 1.2g IV	Clindamycin 600mg IV **PLUS** Gentamicin 3mg/kg IV (use ideal body weight) (Omit Gentamicin if eGFR<30ml/min)	Teicoplanin 400mg IV **PLUS** Metronidazole 500mg IV **PLUS** Gentamicin 3mg/kg IV (use ideal body weight) (Omit Gentamicin if eGFR <30ml/min)	**1 dose at induction**
Salivary gland surgery	**Contamination unlikely**	**Prophylaxis is not recommended**			
	Possible contamination	Co-amoxiclav 1.2g IV	Clindamycin 600mg IV	Teicoplanin 400mg IV **PLUS** Metronidazole 500mg IV	**Single doses only**
Incision & drainage of dental abscess	**Most drained abscesses do not required antibiotics**.	Amoxicillin 1g IV 8 hourly **PLUS** Metronidazole 500mg IV 8 hourly for 24-48 hours	Clarithromycin 500mg IV 12 hourly **PLUS** Metronidazole 500mg IV 8		

	If signs of spreading infection or systemic illness give:	**THEN ORAL SWITCH TO** Amoxicillin 500mg 8 hourly **PLUS** Metronidazole 400mg 8 hourly **TOTAL DURATION OF TREATMENT 5 DAYS** **(including IV)**	hourly for 24-48 hours **THEN ORAL SWITCH TO** Clarithromycin 500mg 12 hourly **PLUS** Metronidazole 400mg 8 hourly **TOTAL DURATION OF TREATMENT 5 DAYS** **(including IV)**		

5.3 ABSENT OR DYSFUNCTIONAL SPLEEN GUIDELINES FOR PROPHYLAXIS

5.3.1 SPLENECTOMY - GENERAL INFORMATION

Guidelines for the management of adults with an absent or dysfunctional spleen

Asplenic patients are at a greater risk of developing fulminant, life-threatening sepsis and so must be appropriately vaccinated and receive antibiotic prophylaxis. The main causative organisms are:

- *Streptococcus pneumoniae*
- *Haemophilus influenzae* type b
- *Neisseria meningitidis*

Elective splenectomy

Immunise at least TWO (ideally four to six) weeks prior to surgery. If it is not practical to vaccinate two weeks prior to splenectomy immunisation should be delayed until at least two weeks after the operation.

Prophylactic antibiotics to start post-surgery.

Emergency splenectomy

Immunise at least TWO weeks post-surgery, or before discharge from hospital.

Prophylactic antibiotics to be started immediately.

Prior to Chemotherapy â€“ all patients

If it is not practicable to vaccinate two weeks before the initiation of chemotherapy and/or radiotherapy, immunisation can be delayed until at least three months after completion of therapy in order to maximise the response to the vaccine. Immunisation of these patients should not be delayed if this is likely to result in a failure to vaccinate.

5.3.2 VACCINATIONS

Vaccinations post splenectomy

All the necessary vaccines can be given on the same day, rotating the injection site

Initial vaccinations required	**Follow up vaccination 1-2 months later**	**Other vaccinations recommended**
Pneumococcal vaccine polyvalent (Pneumovax II$^{Â®}$) Single dose of 0.5mL IM	**Meningococcal group B vaccine (Bexsero$^{Â®}$)** One dose of 0.5ml IM of Meningococcal group B vaccine (Bexsero	**Influenza** Adults should receive yearly immunisation via their G.P. (September to April)
Hib and Meningococcal Conjugate Group C (Menitorix$^{Â®}$) Previously fully immunised: Offer reinforcing dose of 0.5mL im of Hib/MenC (Menitorix$^{Â®}$)	**Meningococcal ACWY Conjugate (MenveoÂ®)** Single dose 0.5mL IM (preferably into the deltoid region) of MenveoÂ®	**Pneumococcal vaccine polyvalent (Pneumovax II$^{Â®}$)** Single reinforcing dose of 0.5mL IM every 5 years
Meningococcal group B vaccine (Bexsero$^{Â®}$) One dose of 0.5ml IM of Meningococcal group B vaccine		

(Bexsero$^{A®}$)	

Asplenic or splenic dysfunction

All the necessary vaccines can be given on the same day, rotating the injection site

Initial vaccinations required	**Follow up vaccination 1 month later**
Pneumococcal vaccine polyvalent (Pneumovax II$^{Â®}$) Single dose of 0.5mL IM	**Meningococcal ACWY Conjugate (MenveoÂ®)** Single dose 0.5mL IM (preferably into the deltoid region) of MenveoÂ®
Hib and Meningococcal Conjugate Group C (Menitorix$^{Â®}$) Previously fully immunised: Offer reinforcing dose of 0.5mL im of Hib/MenC (Menitorix$^{Â®}$)	
If not already received: **Meningococcal group B vaccine (Bexsero$^{Â®}$)** One dose of 0.5ml IM of Meningococcal group B vaccine (Bexsero$^{Â®}$)	**If not already received:** **Meningococcal group B vaccine (Bexsero$^{Â®}$)** One dose of 0.5ml IM of Meningococcal group B vaccine (Bexsero

5.3.3 ADULT ANTIBIOTIC PROPHYLAXIS SUMMARY

Adult antibiotic prophylaxis summary

Adults should receive lifelong prophylaxis

First Line

Phenoxymethylpenicillin (Penicillin V) 500mg PO 12 hourly

Second Line / Penicillin allergy

Erythromycin 500mg PO 12 hourly