Croydon Health Services NHS
NHS Trust

EMPIRICAL ANTIBIOTIC GUIDELINES FOR THE MANAGEMENT OF COMMON INFECTIONS IN ADULT INPATIENTS

Useful Telephone Numbers

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Medicines Information 3059

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Relevant Standards(e.g. HSE, Health and Social Care Act)	
Acknowledgements	Katie Heard Antimicrobial Pharmacist
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CONTENTS

1 INTRODUCTION

All NHS bodies are legally responsible for having antimicrobial prescribing policies and guidelines in place as summarised in the following publications from the Department of Health (DH): The *Health and Social Care Act, Code of Practice for health and adult social care on the prevention and control of infections and related guidance. 2008 (Updated 2009.)*[1] and the *Health Act 2006 Code of Practice for the Prevention and Control of Healthcare Associated Infections.*[2]

To support antimicrobial stewardship and prudent prescribing the DH issued specific recommendations in the supporting document, '*Start Smart then Focus; Antimicrobial Stewardship toolkit for English hospitals.'* This details antimicrobial treatment alogorithms and defines components of best practice for the Trust.[3]

At CHS best practice principles are defined in the 'Antimicrobial Stewardship Policy.'

2 PURPOSE

The purpose of empirical antibiotic guidelines are to:

- Guide prescribers on the use of antibiotics in an evidence-based manner.
- Reduce the incidence of Healthcare Associated Infections (HCAIs)
- Reduce the emergence of antimicrobial resistance
- Minimise adverse effects
- Make the Trust compliant with the Health and Social Care Act.

Prescribers should note that the antibiotics advised here are for EMPIRICAL purposes only. Once culture and sensitivities are available, the choice of antibiotic should be changed to one with the narrowest spectrum which the organism is sensitive to.

3 DEFINITIONS

Empirical Antibiotics; Antibiotic therapy commenced before the identification of the causative micro-organism.

4 ACCOUNTABILITIES AND RESPONSIBILITIES

Medical and non-medical prescribers are responsible for complying with the guidelines and others relating to antimicrobials and infection control documented here or within their departments. They are responsible for attending all relevant courses on antimicrobial prescribing and use. They are responsible for implementing actions within their speciality and/or directorate, from the results of audit and, where applicable, devising and implementing action plans to improve performance.

The director of infection prevention and control (DIPC) is accountable for the content, implementation and monitoring of the guidelines. Currently the DIPC is the Acting Director of Nursing.

The clinical directors are responsible for supporting the guidelines and addressing non-compliance within their directorates.

The antibiotic pharmacist is responsible for co-ordinating review of the guidelines, promoting awareness amongst prescribers, pharmacists and nursing staff, designing and implementing initiatives to support adherence, auditing adherence and reporting audit reports to the infection control taskforce / committee.
The chief pharmacist is responsible for supporting the policy through the activities of the trust pharmacists.

Trust pharmacists are responsible for alerting prescribers of the guidelines, encouraging adherence and reporting non-adherence to the Antibiotic Pharmacist.

The medical microbiologists are responsible for formulating antimicrobial guidelines in conjunction with clinical teams, providing advice on antimicrobial use, promoting awareness of the guidelines and encouraging adherence. They are also responsible for controlling antimicrobial use by laboratory antibiotic sensitivity reporting systems.

Nursing staff are responsible for ensuring samples are sent in a timely manner. Also responsible for encouraging adherence to the guidelines including the antibiotic stewardship policy.

5 PROCEDURE/COURSE OF ACTION REQUIRED

5.1 PRINCIPLES OF GOOD ANTIBIOTIC PRESCRIBING

These are described comprehensively in the antimicrobial policy, 'Antimicrobial Stewardship Policy';

- Always take appropriate cultures before antibiotic administration where clinically feasible. Review therapy after 48hrs and/or after results of culture and sensitivity
- Consider individual patient factors in all cases: Allergies/previous antibiotic history/previous infection with multi-resistant organism (such as MRSA, ESBL or CRO) /availability of oral route/renal &hepatic dysfunction/pregnancy or breast feeding/immunocompromised, recent travel, predisposition to C.difficile infection.
- To reduce / prevent C. difficile infections minimise course length of antibiotics and use the narrowest spectrum of antibiotics suitable. Cultures are vital to guide narrow spectrum prescribing especially in patients over 65 years of age.
- Follow up all culture results and rationalise antibiotics according to microbiology culture and sensitivity results
- Need for IV therapy must be reviewed every 24 hours and patient switched to oral alternative as soon as possible
- If evidence of clinical deterioration discuss with microbiologist
- Therapeutic Drug Monitoring (TDM) is required for patients on Amikacin, Gentamicin and Vancomycin. And if on prolonged teicoplanin. Please refer to separate TDM guidance on the intranet.

5.2 IV TO ORAL SWITCH GUIDANCE

Clinical improvement –Consider **IV to Oral or stopping therapy**
Excludes severely immunocompromised patients such as chemotherapy-related neutropenia and/or bone marrow transplant.

- The majority of patients with a severe infection who are adequately absorbing oral medication and initially require IV therapy can be safely switched to oral therapy within 72 hrs. There should be no barrier to discontinuing antibiotics if they are not indicated.
- For considerations for early switch to oral therapy see "HOME". Patients should generally have all of the HOME criteria

  Heamodynamically stable, apyrexial for >36hours

  Oral route available and not compromised

  Markers of infection trending towards normal

  Exclusion of deep source of infection (abscess, endocarditis, CNS infection)

- Review at 48-72 hours after starting IVs and then at least every 24 hours
- Early IV to oral switch when appropriate has many proven benefits
- Oral switch guidance is summarised through this document.
- Oral switch guidance is based on **empirical** choice. This must be guided by microbiology results where available.

If clinical deterioration - escalation / discuss with a microbiologist

- Allow antibiotics 48 hours to work unless severe clinical deterioration
  - Spikes in the first 2 days of treatment do not necessarily mean non-response – use clinical judgement. Add stat aminoglycoside to therapy if appropriate

5.3 ALLERGIES

A thorough allergy history should be obtained for all patients on admission. All details of allergy should be recorded accurately and in full. Any patient with an allergy should be given a red allergy wrist band.

Penicillin allergy

Patients with a history of penicillin allergy should be reviewed to exclude a non-immunological adverse reaction, (for example, diarrhoea, vomiting, non-specific maculopapular rash) or, an experience wrongly attributed to the antibiotic (for example, ampicillin and Epstein-Barr virus infection).

Table 1 Classification scheme for adverse drug reactions (adapted from Gell and Coombs)

Classification	Time of onset (hours)	Mediators	Clinical signs	Comments
Allergic immediate (Type I) *	<1	Antibiotic-specific IgE antibodies	Anaphylaxis and /or hypotension, laryngeal oedema, wheezing, angioedema or urticaria	**AVOID ALL BETA-LACTAMS** More likely with parenteral than oral administration; fatal outcome in 1 per 50,000 to 100,000 treatment courses with penicillin
Late (Type II)	72	IgG, complement	Increased clearance of red blood cells and platelets by lymphoreticular system	IgE not involved; **can use a cephalosporin/Carbopenem**
Type III	>72	IgG and IgM immune complexes	Serum sickness, tissue injury	Tissue lodging of immune complexes; drug fever; IgE not involved; **can use a cephalosporin/Carbopenem**
Type IV	≥72		Contact dermatitis	IgE not involved; **Anaphylaxis risk to BETA-LACTAMS low**
Other (idiopathic) - *non-severe (no systemic involvement)*	Usually>72	Unknown	Maculopapular or morbilliform rashes	IgE not involved; **Anaphylaxis risk to BETA-LACTAMS low** Common following viral infections and toxin induced sepsis. A cephalosporin or penicillin (if moderate-severe infection) possible but risk of rash reoccurrence after 3-10 days
- ***severe delayed reactions*** *(systemic or organ involvement)*	Usually>72	Unknown	Serum sickness-like reaction (vasculitic rash), Drug rash with eosinophilia and systemic symptoms (DRESS), or Stevens-Johnson syndrome/toxic epidermal necrolysis	**AVOID ALL BETA-LACTAMS** Discuss treatment options with microbiology / immunology

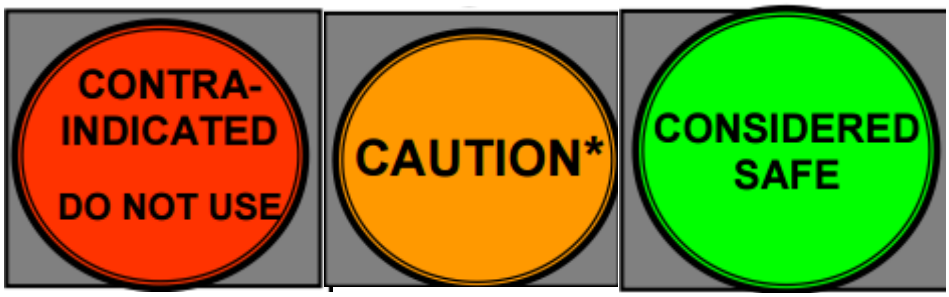


Figure 1. Penicillin Traffic Light (Safe prescribing in allergic patients)

Prescribing in penicillin allergy;
Drugs in **RED** are contra-indicated in penicillin allergy
Drugs in **ORANGE** should be prescribed with caution
Drugs in **GREEN** are considered safe.
Caution = avoid if allergy history suggests **angioedema (blistering or swelling), bronchospasm, or urticaria (itchy rash)** within minutes to hours after penicillin administration, or if **allergy history is unclear**, are at risk of immediate (Type 1) hypersensitivity to penicillins and anaphylaxis; these individuals should **NOT** receive penicillins, cephalosporins or other beta-lactam antibiotic

Non-penicillin allergies

Co-trimoxazole – Co-trimoxazole contains trimethoprim and a sulphur based product. Check for allergies to sulphur prior to prescribing.

Glycopeptides – Many reported allergies to gylcopeptides (vancomycin and teicoplanin are infusion related and by running the infusion slower can be prevented. Obtain a full history from your patient and discuss with a pharmacist if you are unsure.

BONE AND JOINT

SEPTIC ARTHRITIS

	FIRST LINE THERAPY	ALTERNATIVE OPTION
		First line if known MRSA
Common pathogens: *Staphylococcus aureus , Beta-haemolytic streptococci* *Neisseria gonorrhoeae (esp. <30 years of age, sexually active adults, pustular skin lesions, tenosynovitis and negative joint cultures)* *Gram - negative bacilli (more common in elderly & immunocompromised)* *Anaerobes (more likely with history of penetrating trauma)* **Notes:** a. Send a joint aspirate for MC&S, TB and cytology (crystals) AND blood cultures PRIOR TO initiating antibiotics – DO NOT put joint fluid in to the blood culture bottles b. Consult a microbiologist at earliest opportunity, particularly if history of foreign travel, associated GU infection, presence of prosthetic joint / metalwork or pre-existing joint pathology c. A possibly infected prosthetic joint should always be referred to an orthopaedic surgeon **d.** Early treatment with antibiotics and drainage reduces joint destruction	**Native joint not MRSA positive:** **Flucloxacillin** 2g IV QDS **High-risk cases** Risk of gram –ve infection: Elderly, frail, recurrent UTI, recent abdominal surgery, IVDU, diabetic, needing HDU/ITU. Discuss with Consultant microbiologist **High risk MRSA:** (Recurrent in-patient, nursing home resident, leg ulcers or catheters): Send urgent MRSA screen, and treat as per MRSA. **If gonococcal septic arthritis suspected:** **CefTRIAXone** 2g IV OD PLUS discuss with Consultant microbiologist **Chronic infection, Prosthetic joint, known colonisation of other organs (e.g. cystic fibrosis):** Please obtain deep sample **arrange for urgent processing in the lab** and discuss with Consultant Microbiologist prior to starting therapy	**Native joint MRSA positive:** **Teicoplanin** IV (see trust dosing guide) **High-risk cases** Risk of gram –ve infection: Elderly, frail, recurrent UTI, recent abdominal surgery, IVDU, diabetic, needing HDU/ITU. Discuss with Consultant microbiologist **If gonococcal septic arthritis suspected:** Discuss with Consultant microbiologist **Chronic infection, Prosthetic joint , known colonisation of other organs (e.g. cystic fibrosis):** Please obtain deep sample arrange for urgent processing in the lab and discuss with Consultant Microbiologist prior to starting therapy

48-72 hour review:

- Review joint with MC&S and crystal report, if no improvement, clinical deterioration or uncertainty of diagnosis refer to orthopaedics and discuss with a microbiologist. Stop antibiotics if no evidence of infection. Consider orals if well and treating SSTI infection not septic joint.

Duration:

- For septic arthritis: 6 weeks, with a minimum of 2 weeks IV antibiotics, this can be facilitated as an outpatient (OPAT) if the patient is otherwise well. Discuss oral step down/OPAT with Consultant microbiologist

BONE AND JOINT

	First Line Therapy	Alternative Option
Acute Osteomyelitis		**First line if known MRSA**
Common pathogens: *Staphylococcus aureus , Beta-haemolytic streptococci* *Neisseria gonorrhoeae (esp. <30 years of age, sexually active adults, pustular skin lesions, tenosynovitis and negative joint cultures)* *Gram - negative bacilli (more common in elderly & immunocompromised)* *Anaerobes (more likely with history of penetrating trauma)* **Notes:** a. Send a joint aspirate/deep tissue sample or swab if possible AND blood cultures for MC&S PRIOR TO initiating antibiotics – DO NOT put joint fluid in to the blood culture bottles b. Consult a microbiologist at earliest opportunity, particularly if history of foreign travel, associated GU infection, presence of prosthetic joint or metalwork or pre-existing joint pathology c. If x-ray is negative but a high suspicion remains discuss appropriate imaging with radiology.	**Discuss with a microbiologist,** option for empiric treatment is as follows **once samples taken:** **Flucloxcillin** 2g IV QDS *Add*: **Gentamicin** STAT if systemically unwell (see trust dosing guide) **Diabetic – see separate pathway** **High risk MRSA:** (Recurrent in-patient, nursing home resident, leg ulcers or catheters): Send urgent MRSA screen, and treat as per MRSA.	**Discuss with a microbiologist**, option for empiric treatment is as follows **once samples taken:** **Teicoplanin** IV (see trust dosing guide) *Add*: **Gentamicin** STAT if systemically unwell (see trust dosing guide) **Diabetic – see separate pathway**

48-72 hour review:

- Review with imaging and MC&S, if no improvement, clinical deterioration or uncertainty of diagnosis refer to orthopaedics and discuss with a microbiologist.
- Stop antibiotics if no evidence of infection. Consider orals if well and treating SSTI infection not septic joint.

Duration:

- For osetomyelitis: 6 weeks (discuss with a microbiologist options of outpatient antimicrobial therapy (OPAT), orals may be considered at 2 weeks in some circumstances)

Prosthetic Joint Infection or Chronic Osteomyelitis

Notes: a. Where patient is medically stable, withholding antimicrobials for as long as possible prior to collection of synovial fluid for culture increases likelihood of recovering an organism b. Take blood cultures, check CRP and aspirate joint. c. Give immediate antibiotics if haemodynamically compromised. d. When performing urgent open debridement, take multiple intra-operative samples for culture and arrange for urgent processing by ringing microbiology lab and CUH pathology reception	**Refer to Orthopaedics and discuss with a microbiologist** **Treatment should not be held and blood cultures should be obtained if:** • Fever is present • There is an acute onset of symptoms • The patient has a condition or suspected condition or concomitant infection or pathogen (e.g. Staph aureus) that would make the presence of a bloodstream infection more likely

CARDIOVASCULAR

INFECTIVE ENDOCARDITIS - DIAGNOSTIC CRITERIA FOR ENDOCARDITIS. MODIFIED DUKE CRITERIA

Pathological criteria	Major criteria	Minor criteria
Positive histology or microbiology of pathological material obtained at autopsy or cardiac surgery	2 positive Blood Cultures showing typical organisms consistent with infective endocarditis, such as Streptococcus viridans and the HACEK group	Predisposing heart disease or IVDU
Valve tissue, vegetation, embolic fragments or intracardiac abscess content	Persistent bacteraemia from 2 Blood Cultures taken > 12 hours apart or 3 or more positive Blood Cultures where the pathogen is less specific, such as Staphylococcus aureus and Staphylococcus epidermidis	Fever > 38
• **Pathological criteria positive** **OR** • **TWO major criteria** **OR** • **ONE major and THREE minor criteria** **OR** • **FIVE minor criteria**	Positive serology for Coxiella burnetti, Bartonella species, or Chlamydia psittaci	Immunological phenomena such as glomerulonephritis, Osler's nodes, Roth spots, or positive Rheumatoid factor
		Microbiological evidence not fitting major criteria
	Positive molecular assays for specific gene targets	Elevated C reactive protein (CRP) or erythrocyte sedimentation rate (ESR)
	Positive echocardiogram showing oscillating structures, abscess formation, or new dehiscence of prosthetic valves OR new valvular regurgitation.	Vascular phenomena such as major emboli, splenomegaly, clubbing, splinter haemorrhages, petechiae or purpura

Before starting antibiotics, **ALWAYS** Take 3 sets of blood cultures (from 3 separate venepuncture sites) at the same time. For each set send samples in an aerobic and anaerobic bottles.

Always discuss with microbiology + Cardiology

Empiric treatment options for infective endocarditis will be personalised based on patient risk factors including:
- Presence of prosthetic material / valves
- Immuno-competency
- History of cardio-thoracic surgery
- Recent microbiology
- Known / risk factors for intravenous drug usage (IVDU)

EMPIRICAL THERAPY

Native valve:
Amoxicillin 2g IV 4 hourly *plus*
Flucloxacillin 2g 4 hourly *plus*
Gentamicin 3mg/kg IV 24 hourly
Discuss with micro pharmacist if CrCl <20ml/min

MRSA positive, true penicillin allergy, prosthetic valve:
Vancomycin IV, modified according to renal function *plus*
Gentamicin 3mg/kg IV 24 hourly
Discuss with micro pharmacist if CrCl <20ml/min

Addition in prosthetic valve:
Rifampicin 600mg PO 12 hourly starting day 3 of therapy

BD Gentamicin – it may be appropriate to use Gentamicin 1mg/kg BD upon positive microbiology on consultant microbiologist advice.
48-72h review : Review regime with blood culture results and discussion with a Consultant microbiologist
Duration of therapy: should be discussed with a Consultant microbiologist minimum 2 weeks IV therapy.

CENTRAL NERVOUS SYSTEM - Classical CSF Features of the different causes of meningitis.

	Normal	Bacterial	Viral	Tuberculous	Fungal
Opening Pressure (cm CSF)	12-20	Raised	Normal/mildly raised	Raised	Raised
Appearance	Clear	Turbid, cloudy, purulent	Clear	Clear or cloudy	Clear or cloudy
CSF WCC (cells/uL)[a]	<5	Raised (typically >100)	Raised (typically 5-1000)	Raised (typically 5-1000)	Raised (typically 5-1000)
Predominant cell type	n/a	Neutrophils[b]	Lymphocytes[c]	Lymphocytes[d]	Lymphocytes
CSF protein (g/L)	<0.4	Raised	Mildly raised	Markedly raised	Raised
CSF/plasma glucose ratio	>0.66	Very low	Normal/slightly low	Very low	Low

A traumatic lumbar puncture will affect the results by falsely elevating the white cells due to excessive red cells.
a) Occasionally the CSF WCC may be normal (especially in immunodeficiency or tuberculous meningitis).
b) May be lymphocytic if antibiotics given before lumbar puncture (partially treated bacterial meningitis), or with certain bacteria e.g. Listeria monocytogenes.
c) May be neutrophilic in enteroviral meningitis (especially early in disease).
d) May be neutrophils early on in the course of disease.

Key aetiological considerations for specific demographic groups in meningitis	
Young adults	Viral meningitis more common than bacterial, especially in women in their 20s -40s. (Enterovirus most common) Second peak of meningococcal disease in late teens/early 20s
Older adults	Pneumococcal disease more common in over 50s, Listeria commoner in over 60s but remains rare.
Skull fracture/CSF leak	Pneumococcal meningitis and a risk factor for recurrent meningitis
Previous lymphocytic meningitis	HSV-2 is the commonest cause of recurrent lymphocytic meningitis
Rash	Meningococcal meningitis more likely to present with a rash than pneumococcal meningitis
Co-existing upper respiratory tract infection e.g. otitis media, sinusitis	Pneumococcal meningitis is often associated with an upper respiratory tract infection
HIV Positive	Cryptococcal meningitis - common in those with a CD4 count <100 x 10^6 but should be considered in anyone with a CD4 count of <200 x 10^6 or <14%. TB meningitis an important consideration at all CD4 counts Pneumococcal meningitis also increased
Other immunocompromised	Asplenic individuals are at increased risk from all encapsulated bacteria e.g. Streptococcus pneumoniae, Neisseria meningitidis and Haemophilus influenzae. Complement deficiency increases risk of meningococcal disease. Risk factors for listeria meningitis include relative immunocompromise from alcohol dependency, diabetes and malignancy as well as overt immunocompromised from illness or medication.
Travel history	An appropriate travel history may determine other rarer causes including Toscana Virus (Mediterranean), Tick Borne Encephalitis Virus (Central and Eastern Europe), other meningococcal (meningitis belt in Africa), West Nile Virus (USA), Lyme disease (appropriate exposure in Europe or USA) and parasitic meningitis (such as Naegleri fowleri e abundant globally occurring following visits to warm, fresh or brackish water, or trypanosomiasis e South America or parts of Africa).

CENTRAL NERVOUS SYSTEM

MENINGITIS

	FIRST LINE THERAPY	ALTERNATIVE OPTION
Common pathogens: *Streptococcus pneumoniae, group B Streptococcus, Neisseria meningitidis, Haemophilus influenzae, and Listeria monocytogenes, viral (incl.* Herpes simplex)	**Ceftriaxone** 2g IV BD	**Chloramphenicol*** 25mg/kg IV QDS. If to continue, reduce dose to 1g QDS after 24-48 hrs *Risk of aplastic anaemia – monitor full blood count at least twice weekly
	***Listeria* risk factor present:** *Add* **Amoxicillin** 2g IV 4-hrly	***Listeria* risk factor present:** *Add* **Co-trimoxazole** 120mg/kg/day IV in 2-4 divided doses *(not suitable in sulphur allergy)*
	If penicillin-resistant Streptococcus pneumoniae is suspected, or if a patient has recently returned from areas where this is prevalent (e.g. Spain, South East Asia, USA) then *add*: **Vancomycin** IV (see local dosing guide)	
	Signs of Viral Encephalitis *(i.e. seizures, altered mental status or other focal neurology)* **Aciclovir** 10mg/kg IV TDS (consider 15mg/kg TDS in varicella zoster associated encephalitis) for 14 N.B 21 days if immunocompromised or repeat LP is PCR positive **(oral not recommended)** *****Risk of AKI, discuss with a Consultant microbiologist if severe AKI. ***** **Valaciclovir** is an oral alternative however not considered gold standard treatment, please discuss with microbiology. Enteroviruses are the commonest cause of viral meningitis. Antivirals are not indicated and no antibiotics necessary, remember to take stool sample and viral throat swab to aid diagnosis	
	Adjunctive therapy: give **dexamethasone** 10mg before or up to 12 hours after administration of first dose of antibiotic (esp. if suspecting pneumococcal meningitis) – **AVOID** in septic shock, meningococcal septicaemia, immunosuppression and following neurosurgery. If pneumococcal meningitis confirmed, continue for 4 days. If other pathogen confirmed, stop dexamethasone. • ≥ 60kg: Dexamethasone 10mg IV QDS • < 60kg Dexamethasone 0.15mg/kg IV QDS	
	48-72h review : Follow up C&S results and discuss step down treatment with a microbiologist	

Notes:
Unless meningococcal septicaemia is suspected then the patient should have a lumbar puncture (LP) before antibiotics provided the LP can be done within 30 minutes. If bacterial meningitis is suspected and the LP cannot be done within 30 minutes then antibiotics should be given but the LP done as soon as possible and definitely within 4 hours of the antibiotic dose.
Immunocompromised patients, brain abscess, VP shunt or other complicating factor should always be discussed with a microbiologist as early as possible.
HIV +ve patients to be discussed with HIV team as early as possible

Risk factors for *Listeria* infection*:*

- *>50 years*
- *Immunocompromised*
- *Alcoholic*
- *Diabetic*
- *Pregnant*
- *Unexplained confusion*

Diagnosis

- Lumbar puncture (LP) if no contraindication

(Protein, Glucose, Pressure, MC&S, meningococcal & pneumoncoccal PCR, consider viral PCR. (see next page)

- Serum glucose *(to compare to CSF glucose)*
- Confirm any recent travel
- Send for urinary pneumococcal antigen
- Blood gas *(lactate)*

Notify Public Health: They will direct contact prophylaxis

- 0208 6826132 (Day time) / 0208 3904008 (out of hours)

Recommended duration of intravenous antibiotic therapy	
Unknown	10 days
Neisseria meningitidis(Meningococcus)	5 days
Strep pneumoniae(pneumococcus)	10 –14 days
Haem. Influenzae	10 days
Listeria monocytogenes	≥21days

GI Tract / Abdominal

Infective Gastroenteritis

- No pathogen is found for majority of patients admitted to hospital for gastroenteritis
- Viruses (mainly noro, rota and adenoviruses) account for the majority of cases
- **Metronidazole is not effective in most causes of diarrhoea**
- Possible bacterial pathogens include: Campylobacter spp., Salmonella spp., Shigella spp. E coli 0157

If diarrhoea is of prolonged duration, if there is a history of recent foreign travel or in cases of immunodeficiency – send stool specimen for bacterial culture and discuss with a microbiologist.

Notify Public Health:

- **Please notify suspected cases of food poisoning to PHE**

<u>DO NOT</u> routinely give antibiotics to patients with gastroenteritis. Most infections are VIRAL

Antimicrobial treatment should only be considered if the patient is:

- **systemically unwell (≥ 6 unformed stools / day ± temp ≥ 38ºC, tenesmus, bacteraemic) OR**
- **immunocompromised**

Then carefully consideration over causative agent and appropriate treatment should be taken

GI Tract / Abdominal

	First Line Treatment	Alternative Treatment Option
Acute Abdomen / Abdominal Sepsis*		
Includes: Including cholecystitis, cholangitis, diverticulitis & appendicitis, peritonitis, bowel perforation, ruptured appendix* *DO NOT routinely treat biliary colic* *Do NOT treat Crohns/UC unless clear signs of infection* Any patients with history of ESBL or prosthetic devices in place (stents etc.) should be discussed with a microbiologist. **Meropenem is a suitable empirical option if history of ESBL. **Common pathogens:** Polymicrobial including Enterobacteriaceae, Enterococcus spp., Bacteroides spp., Clostridium spp. **Notes:** a. Consider the possibility of a collection if a patient fails to respond – may not be inadequate spectrum of antibiotics b. Obtain an urgent surgical opinion; the underlying cause of peritonitis is usually managed surgically c. Discuss patient with a microbiologist if evidence or suspicion of ESBL or CRO colonisation d. <u>If patient deteriorating;</u> discuss with a microbiologist for escalation options	**Co-amoxiclav** IV 1.2g TDS Give 1-2 doses of **gentamicin** IV if heamodynamically unstable (See trust dosing guide) <u>*In bowel perforation or where abscess is present:*</u> Add **metronidazole** PO 400mg TDS (**Co-amoxiclav** has suitable anaerobic cover in all other indications)	**CefTRIAXone** IV 2g OD Plus **metronidazole** PO 400mg TDS Give 1-2 doses of **gentamicin** IV if heamodynamically unstable (See trust dosing guide) **Beta-Lactam free option:** **Ciprofloxacin** PO 500mg BD Plus **Metronidazole** PO 400mg TDS Give 1-2 doses of **gentamicin** IV if heamodynamically unstable (See trust dosing guide)
	Oral **metronidazole** and **ciprofloxacin** both have very high oral bioavailability. Only give IV if overtly septic or concerns over absorption.	
	48-72 hour Review: ***Clinical improvement and NO deep source of infection found*;** De-escalate as per culture results or empirically to **Co-amoxiclav** PO 625 mg TDS (or **Ciprofloxacin** 500mg BD + **Metronidazole** PO 400mg TDS for beta-lactam free option) ***Clinical deterioration or still pyrexial and requiring gentamicin**;* consider abscess and discuss with a microbiologist. **Duration:** Most indications can be treated safely with 5 days total treatment. Please discuss with a microbiologist if longer courses are required. **Bowel perforation, ruptured appendix:** Duration should be guided by response and source control. Discuss cases with a microbiologist.	

GI Tract / Abdominal

	First Line Treatment	Alternative Treatment Option

Liver Abscess

Common pathogens:
Streptococcus milleri, Enterobacteriaceae (esp. Klebsiella sp.), Bacteroides, Enterococcus sp., *Entamoeba histolytica*

Any patients with history of ESBL or prosthetic devices in place (stents etc.) or with recent travel should be discussed with a microbiologist

Notes:

a. Pyogenic abscesses have a high mortality rate of 40%
b. Send clotted blood sample for amoebic serology
c. Abscess drainage is the optimal therapy
d. Send aspirate for gram stain and aerobic / anaerobic culture
e. Patients with stents should be discussed with a microbiologist

CefTRIAXone IV 2g OD
Plus **Metronidazole** PO 400mg TDS

Give 1-2 doses of **gentamicin** IV in severe sepsis *(see trust dosing guide)*

Teicoplanin IV (see trust dosing guidelines) Plus
Ciprofloxacin PO 750mg BD
Plus **Metronidazole** PO 400mg TDS
Give 1-2 doses of **gentamicin** IV in severe sepsis *(see trust dosing guide)*

Oral **metronidazole** and **ciprofloxacin** both have very high oral bioavailability. Only give IV if overtly septic or concerns over absorption.

48-72 hour review:
All cases should be discussed with a microbiologist
Drainage should be attempted where viable

Duration should be guided by source control, response and repeat imaging where indicated, discuss with a microbiologist.

Necrotising Pancreatitis

Common pathogens:
Enterobacteriaceae, Enterococcus spp., *Staphylococcus aureus*, Anaerobes

Notes:

a. Prophylactic antibiotics do not prevent infected necrosis or death in acute necrotising pancreatitis
b. High fevers are common in non-infective pancreatitis, if infection suspected, discuss with GI team / microbiologist as antibiotic prophylaxis not recommended in mild pancreatitis
c. If infection suspected, obtain aspirate for gram stain & culture, begin empiric antibiotics, & continue ABX only if culture positive
d. Infected necrosis usually presents in 2nd or 3rd week

Antibiotic therapy not routinely recommended for initial presentation of pancreatitis.

High fevers are common in non-infective pancreatitis. If extra-pancreatic infection suspected, treat as abdominal sepsis (above)
Infected necrosis should be considered in patients with pancreatic or extrapancreatic necrosis who deteriorate or fail to improve after 7 – 10 days of hospitalisation

Once pancreatic necrosis (≥ 30%) has been proven by CT criteria:

Piperacillin/Tazobactam IV 4.5g TDS

Once pancreatic necrosis (≥ 30%) has been proven by CT criteria:

Teicoplanin IV (see trust dosing guidelines)
+ **ciprofloxacin** 750mg PO (IV 400mg) BD
+ **metronidazole** 400mg PO (IV 500mg) TDS

48-72 hour review: All cases should be discussed with a microbiologist

Duration: Should be guided by response discuss with a microbiologist

GI Tract / Abdominal

	First Line Treatment	Alternative Treatment Option

Variceal associated GI bleed

Common pathogens:
Enterobacteriaceae

Notes:
a. Treatment of non-variceal GI bleeding in the absence of infections is not recommended

CefTRIAXone IV 2g OD

Ciprofloxacin PO 500mg BD
(Only give IV if concerns over absorption)

48-72 hour Review:
If patient is eating/drinking, active bleeding resolved and patient clinically stable;
De-escalate as per culture results or empirically to **Co-amoxiclav** PO (or **Ciprofloxacin** PO for beta-lactam free option)

If patient deteriorating; discuss with a microbiologist for escalation options

Duration:
Antimicrobial therapy of established infection should be limited to 5 days discuss longer courses with a microbiologist

Spontaneous bacterial peritonitis

Common pathogens:
Enterobacteriaceae (esp. Klebsiella sp.), Bacteroides, Enterococcus sp., Streptococci.

Notes:
a. Tap and send cultures for MC&S prior to starting antibiotics
b. WCC >250 cells/µL is indicative of infection
c. Most episodes of spontaneous bacterial peritonitis (SBP) are thought to result from bacterial translocation from the gut.

Prophylaxis
Given the risk of resistance and alteration of gut flora, prophylaxis should be reserved for:

- Previous history of SBP

or

- Patients with ascitic fluid total protein less than 1.5 g/dL and one of the following:
  - Serum creatinine ≥1.2mg/dL
  - Blood urea nitrogen ≥25mg/dL
  - Serum sodium ≤130mEq/L
  - Child-Pugh score ≥9 + bilirubin ≥3mg/dL

Treatment

Piperacillin-tazobactam IV 4.5g TDS

Ciprofloxacin PO 500mg BD + **metronidazole** PO 400mg TDS
If prophylactic ciprofloxacin has been used:
Co-trimoxazole PO 960mg BD *(not suitable in sulphur allergy)* + **metronidazole** PO 400mg TDS

48-72 hour review:

Review with tap results:
WCC <250 cells/ µL and culture negative stop antibiotics or find true source if infection still suspected
WCC >250 cells/ µL de-escalate to oral option as per sensitivities as soon as suitable
WCC >250 cells/ µL no bacterial growth:

Co-amoxiclav PO 625mg PO TDS — Continue as per initiation

Duration: 5 days total — **Duration**: 5 days total

Prophylaxis

Co-trimoxazole 960mg OD
(not suitable in sulphur allergy)

Ciprofloxacin PO 500mg PO OD

GI Tract / Abdominal

Decompensated liver disease

	First Line Treatment	Alternative Treatment Option
Patients with decompensated liver disease have reduced immunity and are at risk of infection. **Monitored closely for signs of infection and if infection is suspected treat early as per the likely source of infection. Cultures should be obtained and a thorough review at 48 hours should be conducted where antimicrobials should be stopped if infection is unlikely/ruled out.** *Patients with advanced cirrhosis are highly susceptible to the development of infections caused by multi-drug resistant organisms, because they require repeated hospitalisations, are often submitted to invasive procedures and are frequently exposed to antibiotics, either as prophylaxis or as treatment. All these factors are well kown risk factors for the development of infections sustained by resistant organisms. Restrictive use can reduce rates of resitance and improve outcomes when infection does occur.*	**When infection suspected treat as per guidelines for likely source of infection** **Source unknown** **CefTRIAXone** IV 2g OD + **teicoplanin** IV (see trust dosing guide) + **metronidazole** PO 400mg TDS	**Beta-lactam free option** **Ciprofloxacin** PO 500mg BD + **teicoplanin** IV (see trust dosing guide) +**metronidazole** PO 400mg TDS (Only give IV if concerns over absorption)
	If haemodynamically unstable Give a STAT dose of **gentamicin** IV (see local dosing guide). Avoid repeated doses due to high risk of AKI in population.	
	48-72 hour Review: 1. Stop antibiotics if infection unlikely/ruled out 2. Review cultures and likely source and refine treatment based on results. 3. IV to PO switch as early as clinically appropriate 4. Keep courses as short as possible to reduce resistance and side effects.	

CLOSTRIDIODES DIFFICILE [Full trust guidance available on intranet - 'Clostridium Difficile Guidelines']

RISK FACTORS FOR C. DIFFICILE INFECTION

- >65 years
  - Recent antibiotic exposure (last 60 days) (Increased risk with prolonged and multiple courses and broad spectrum)
- Stomach acid reducing medication
- Long duration of hospital stay
- Presence of naso-gastric tube or recent endoscopy

INVESTIGATIONS

- Send faeces for C. difficile toxin
- Magnesium
- Abdo X-ray if abdomen is tender or distended
- FBC, CRP, U&Es & LFTs on alternate days

MANAGEMENT

Isolate patients with diarrhoea (Bristol Type 7), strict infection control

- Review drug chart:
  - Stop unnecessary antibiotics (discuss with a microbiologist if still needed)
  - Stop unnecessary PPIs
  - Stop laxatives
  - Stop anti-motility agents (increased risk of toxic megacolon)
- Monitor and correct fluid balance and electrolytes
  - Ensure weekly nutritional assessment

  Complete an accurate stool chart

Severity of Disease (document in notes)

Severe CDI includes any of the following:	**Life threatening CDI includes any of the following:**
WBC count >15 x 10^9/L	Hypotension (not responsive to fluid challenge)
AKI (eg. >50% above baseline)	Partial or complete ileus or toxic megacolon
Temp > 38.5^{o}C	CT evidence of severe disease
Evidence of severe colitis eg. guarding, abdominal tenderness.	

1st Episode **For recurrence (infection occurring more than 30 days after a previous episode,) discuss with a microbiologist. Infection within 30 days of an episode is relapse and should also be discussed with a microbiologist.**	**Treatment Choice**	**Worsening at 48 hours or no clinical improvement at day 6**
Non-severe CDI: Diarrhoea without any features to suggest severe or life-threatening infection.	**Vancomycin** 125mg QDS PO for 10 days If unable to tolerate oral route: **Metronidazole** 500mg TDS IV and discuss with pharmacy	Escalate to the severe treatment option and discuss with a microbiologist
Severe CDI:	**Vancomycin** 125mg QDS PO for 10 – 14 days If unable to tolerate oral route: **Metronidazole** 500mg TDS IV and discuss with pharmacy	Escalate to life-threatening CDI treatment option and discuss with a microbiologist
Fulminant / Life-threatening CDI : Monitor Lactate levels. If > 2, repeat daily (levels > 5mmol are associated with poor prognosis)	**Vancomycin** 500mg QDS PO + **metronidazole** 500mg TDS IV for 10 – 14 days Refer to Gastroenterology and Surgical Registrars	Contact medical microbiology, Gastroenterology & Surgical Registrars for further advice
Further Treatments available following discussion with microbiologist: Fidoximicin 200mg BD - discuss with pharmacy / microbiologist Vancomycin enemas – discuss with pharmacy / microbiologist IV Immunoglobulin – discuss with pharmacy / microbiologist Faecal transplant – discuss with gastroenterology team	**Taper regime upon advice of consultant Microbiologist :** Vancomycin 125mg QDS PO for 7 days, Vancomycin 125mg BD PO for 7 days then Vancomycin 125mg OD PO for 7 days (option to further taper dose: Vancomycin 125mg Alt Days PO for 7 days, then Vancomycin 125mg every 3 days PO for 2 weeks, then STOP)	

MALARIA - all patients admitted should be discuss with a microbiologist/HTD

General Information:

a. Malaria should be suspected in any patient presenting with a fever or recent history of fever who has travelled to a malaria endemic area within the previous 12 months.
b. **Prompt diagnosis is essential as the patient can deteriorate rapidly**
c. Plasmodium falciparum, P vivax, P ovale, P malariae & P knowlesi are known to cause infection in humans.
d. Hospital of Tropical Diseases are available to provide clinical advice 24 hours a day.
e. If the patient has returned from travel in the past 3 weeks they should be discussed with a microbiologist to exclude other potential diagnoses, eg haemorrhagic fever, typhoid, SARS, avian influenza, etc
f. Secondary bacterial infection can occur, treat with antibiotics if signs of sepsis – discuss with a microbiologist for advice if needed

History:

a. Take a full travel history, including country & area of travel, stopovers and date of return
b. Consider what chemoprophylaxis has been used, including drug, dose & compliance
c. Adherence to malaria prophylaxis should not exclude a diagnosis of malaria
Check if others who have travelled with them have become ill

Symptoms:

Generally non-specific but may include:

Fever / sweats / chills	Diarrhoea
Malaise	Cough
Myalgia	Confusion
Headache	Seizures

Investigations:

a. If patient is currently taking malaria prophylaxis stop it immediately as this can delay diagnosis
b. Send blood films as a matter of urgency
○ Malaria can only be excluded with three negative slides over a period of 48-72 hours
c. FBC, U&Es, LFTs, blood glucose
d. Blood cultures if signs of sepsis
e. Stool culture if diarrhoea
f. Chest x-ray

Severity score:

Uncomplicated:
Parasitaemia <2% and **no** schizonts and no clinical complications
Severe / Complicated:
Parasitaemia >2%
OR Parasitaemia <2% **with** schizonts reported on blood film
OR Parasitaemia <2% **with** complications
Features of severe or complicated disease

a) Impaired consciousness or seizures	b) Spontaneous bleeding/disseminated intravascular coagulation
c) Renal impairment (oliguria < 0.4 ml/kg body weight per hour or creatinine >265µmol/l)	d) Shock (BP < 90/60 mmHg)
e) Acidosis (pH < 7.3)	f) Haemoglobinuria (without G6PD deficiency)
g) Hypoglycaemia (<2.2 mmol/l)	h) Haemoglobin ≤ 8 g/dL
i) Pulmonary oedema or acute respiratory distress syndrome (ARDS)	j) Pregnancy

Treatment

Uncomplicated disease: Refer to the most recent BNF
Severe / Complicated:
Discuss with Hospital for Tropical Diseases (HTD)
Call University College London Hospital switchboard on **020 3456 7890** and ask for the duty doctor at the HTD.

NEUTROPENIC SEPSIS

Discuss with Haematology as soon as possible

Neutropenia is defined as neutrophil count of <0.5 x109/L OR <1 x109/L with expected decline to <0.5 x109/L.

Fever is a single oral temperature of ≥38°C. Diagnose neutropenic sepsis in patients having anti-cancer treatment whose neutrophil count is ≤1.0x10^9 /L and who have a temperature ≥38°C, a temperature of ≥37.5°C on two occasions recorded 1 hour apart, or other signs or symptoms consistent with clinically significant sepsis.

NB fever may not be present in some infected neutropenic patients. Infection should be suspected in any patient who is feeling generally unwell following chemotherapy.

	FIRST LINE THERAPY	ALTERNATIVE OPTION
Suspected or proven infection in a neutropenic patient is a **medical emergency** and is an indication for immediate assessment and immediate treatment with intravenous (IV) (**within 1 hour of presentation**) Inclusion: Patients with **a)** Suspected/confirmed neutropenic sepsis, b) Patient receiving chemotherapy in last 3 months or has bone marrow failure due to primary haematological disorder [**Do not wait for FBC before initiating treatment**]	**Piperacillin /tazobactam** IV 4.5g QDS *Plus* **Gentamicin** IV (see local dosing guidelines) *Do not delay first dose waiting for exact body weight / CrCl*	**Mild to moderate penicillin allergy (eg. Mild rash)** **CefTAZIDime** 2g IV TDS + **teicoplanin** IV + **gentamicin** IV **Severe penicillin allergy (eg. Anaphylaxis or angioedema)** **Ciprofloxacin** 750mg PO BD or 400mg IV BD + **teicoplanin** IV + **gentamicin** IV

48-72 hour review:

Review microbiology and tailor treatment as per results and clinical response

Ongoing pyrexia and no positive microbiology:

Meropenem 1g IV TDS + **teicoplanin** (see local dosing guidelines)

If pyrexia persist after a further 72 hours, consider ADDING in 3rd line antimicrobials after discussion with Consultant haematologist

Amikacin IV (see local dosing guidelines)+

Ambisome (antifungal) IV; test dose 1mg over 15 mins, then 3mg/kg OD

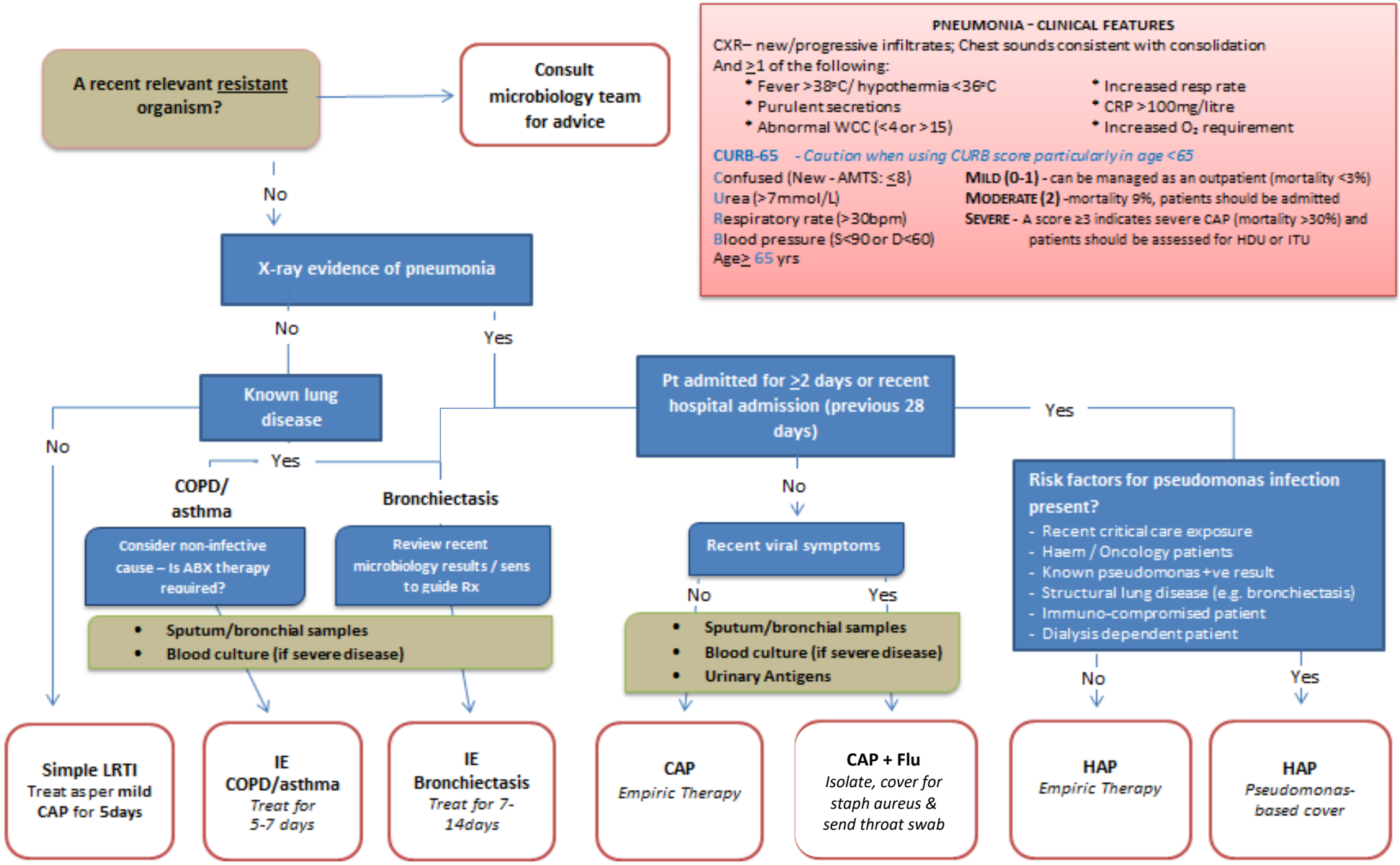
PYREXIA OF UNKNOWN ORIGIN

	FIRST LINE THERAPY	ALTERNATIVE OPTION
In suspected sepsis take blood cultures and start broad spectrum antibiotics within one hour		
Efforts should be made to find source as tailored antibiotics have improved outcomes: Send urine, blood cultures, complete a chest x-ray and other relevant samples as part of septic screen. Consider recent procedures, trauma, travel **Clinical symptoms of infection plus any one of the following:** • Temperature <36°C or ≥38°C • Respiratory Rate ≥ 22 / min • Reduced GCS • SBP ≤100mmHg (or more than 40 mmHg below normal) • HR ≥90BPM or new arrhythmia [beware if on Beta-blocker] • Significantly reduced urine output	**CefTRIAXone** IV 2g OD + **gentamicin** IV STAT (see trust dosing guide) + **teicoplanin** IV (see trust dosing guide)	**Ciprofloxacin** PO 500mg/IV 400mg BD + **teicoplanin** IV (see trust dosing guide) + **gentamicin** IV STAT (see trust dosing guide) (**Ciprofloxacin** has very high oral bioavailabilty only give IV if overtly septic or concerns over absorption)
	Lack of IV access: **Do not delay antibiotics in a septic patient if IV access is not attainable. Speak to a microbiologist / antibiotic pharmacist. An intramuscular or oral alternative may be suitable.**	

48-72 hour review:

A thorough review should occur every 24 hours to identify source, review microbiology and refine antimicrobial choice. Discuss all patients with a microbiologist within 48 hours if focus of infection remains unidentified. Stop antibiotics if infection has been ruled out or is of low suspicion and reculture if needed.

LOWER RESPIRATORY TRACT



PNEUMONIA - CLINICAL FEATURES

CXR– new/progressive infiltrates; Chest sounds consistent with consolidation

And ≥1 of the following:

- Fever >38°C/ hypothermia <36°C
- Purulent secretions
- Abnormal WCC (<4 or >15)
- Increased resp rate
- CRP >100mg/litre
- Increased O_2 requirement

CURB-65 - *Caution when using CURB score particularly in age <65*

Confused (New - AMTS: ≤8)
Urea (>7mmol/L)
Respiratory rate (>30bpm)
Blood pressure (S<90 or D<60)
Age≥ 65 yrs

MILD (0-1) - can be managed as an outpatient (mortality <3%)
MODERATE (2) -mortality 9%, patients should be admitted
SEVERE - A score ≥3 indicates severe CAP (mortality >30%) and patients should be assessed for HDU or ITU

LOWER RESPIRATORY TRACT

FIRST LINE THERAPY | ALTERNATIVE OPTION

COMMUNITY ACQUIRED PNEUMONIA (CAP)

Common Pathogens

Streptococcus pneumoniae, Haemophilus influenzae
'Atypical organism' Legionella, mycoplasma pneumoniae, chlamydophila
Viral (Post viral staph. aureus)

Samples:

Please send samples as early in therapy as possible:

- Sputum samples for MC&S
- Urine for pneumococcal and legionella antigen
- Blood cultures if fevers or CURB ≥3
- Viral swab for PCR if preceding viral symptoms.

48 -72hr hours review

- If patient not improving consider stepwise increase, discuss with micro if concerns about patient.
- Those found to have an empyema or clear pleural fluid with pH <7.2 should have early and effective pleural fluid drainage
- If patient improving, eating and drinking consider IV-PO switch at 48hours and daily thereafter, can be considered earlier if deemed appropriate.
- There should be no barrier to discontinuing antibiotics if they are not indicated.
- Consider any micro or antibody results and focus treatment

Culture positive pneumonia:

- *Chlamydia* or *Mycoplasma spp.*: **Azithromycin** 500mg PO OD for 5 days
- *Legionella spp.*: **Azithromycin** 500mg PO OD for a minimum of 7 days (discuss with a microbiologist) (consider **ciprofloxacin** in severe disease)
- *Strep. pneumoniae* : **Amoxicillin** 1g PO TDS (if penicillin sensitive) for 5 – 10 days (depending on severity of disease)
- *Staph. aureus* : Discuss with a microbiologist

Mild – Moderate CAP (CURB 65= 0-2)

Amoxicillin 1,000mg PO TDS for 5 days
+/- **Doxycycline** 200mg PO OD for 5 days
Consider IV for 24-48 hours if concerns over absorption

Doxycycline 200mg PO OD for 5 days

[Doxycycline **not** advised in **pregnancy** replace with **Clarithromycin** 500mg BD**]**

48-72 hour review

Clinical improvement
-Complete 5 days treatment

Clinical deterioration
-Add **doxycycline** if not already on
-Consider escalation to **Co-amoxiclav** 625mg PO TDS (IV if not absorbing/tolerating oral)

48-72 hour review

Clinical improvement
-Complete 5 days

Clinical deterioration
-Escalate to **Levofloxacin** 500mg PO OD (IV if not absorbing/tolerating oral**)**

Severe CAP / Suspected post viral pneumonia (CURB65 = 3-5)

Co-amoxiclav 1.2g IV TDS *plus* **doxycycline** 200mg PO OD [or **clarithromycin** 500mg IV BD if NBM or not absorbing]

CefTRIAXone 2g IV OD *plus* **doxycycline** 200mg PO OD [or **clarithromycin** 500mg IV BD if NBM/not absorbing]

Beta lactam free regime:
Levofloxacin 500mg PO/IV BD (sufficient atypical cover)

48-72 hours review

Clinical improvement
IV to PO switch **co-amoxiclav** 625mg TDS
Continue **doxycycline** PO
Complete 5 days therapy

If clinical deterioration
-Escalate to **piperacillin-tazobactam** 4.5g TDS
-Discuss with micro
-Rule out collection
-Consider need for MRSA cover
-Reconsider oral therapy after 48hours, discuss with a microbiologist

48-72 hour review

Clinical improvement
IV to PO switch **levofloxacin** 500mg OD

Complete 5 days therapy

If clinical deterioration
- Discuss with micro
-Rule out collection
-Consider need for MRSA cover
-Reconsider oral therapy after 48hours, discuss with a microbiologist

LOWER RESPIRATORY TRACT

ASPIRATION PNEUMONIA

	FIRST LINE THERAPY	ALTERNATIVE OPTION
Common pathogens: *Anaerobes, S. aureus, Gram - negative Bacilli* **Notes:** 1. Do not treat unless consolidation on chest x-ray or evidence of infection 2. Step down to oral as soon as swallow deemed safe **Pneumonitis -** Aspiration of gastric acid causes a chemical pneumonitis. Do not treat initially. If the patient fails to improve after 48 hours consider empiric antibiotic treatment	**Doxycycline** 100mg PO OD + **metronidazole** 400mg PO TDS. **If unable to swallow/clinically unstable:** **Amoxicillin** 1,000mg IV TDS + **metronidazole** 500mg IV TDS.	**If unable to swallow/clinically unstable:** **Levofloxacin** 500mg IV OD + **metronidazole** 500mg IV TDS.

PO switch as soon as swallow deemed safe.

48-72 hour review

Clinical improvement

- If no evidence of infection on x-ray or blood tests, stop
- X-ray evidence switch to PO and complete 5 days

Clinical deterioration

Discuss with micro

EMPYEMA

Common Pathogens

Streptococcus pneumoniae (and other strep), Staphylococcus aureus (including MRSA) – suspect if post viral illness., Anaerobes, Gram negative bacilli (including pseudomonas)

Notes:

a) Send sputum / drain sample before starting therapy

b) For all collections drainage should be considered. Those found to have an empyema or clear pleural fluid with pH <7.2 should have **early and effective** pleural fluid drainage.

c) Discuss all cases with the specialist respiratory team

COMMUNITY ACQUIRED:

Co-Amoxiclav 1.2g IV TDS

CefTRIAXone 2g IV OD
OR levofloxacin 500mg IV BD

If pus putrid – likely anaerobes add **metronidazole** 500mg IV TDS (not required with co-amoxiclav)

If MRSA colonised; Discuss patient with a microbiologist. Consider the addition of **teicoplanin** IV (dose as per guideline) or **linezolid** PO

Discuss all Hospital acquired empyema's with a microbiologist

48-72 hours review

Empyema confirmed and patient improving – continue IV therapy

Confirmed NOT an empyema and clinical improvement - consider IV to oral switch.

If clinical deterioration:

Discuss with a microbiologist

Duration of therapy:

Dependent on clinical response and effectiveness of drainage – Discuss with a microbiologist

INFECTIVE EXACERBATION OF ASTHMA/BRONCHIECTASIS/COPD

Sputum/bronchial samples are vital for appropriate long term management

Common Pathogens

COPD / Bronchiectasis

Streptococcus pneumonia, Haemophilus influenza, Staphylococcus aureus, Moraxella catarrhalis, Pseudomonas aeruginosa, Viral

Asthma

Generally viral or allergen triggered, only start antibiotics if clear signs of infection.

Start Smart:

- Only start therapy if clear signs of infection
- Raised inflammatory markers
- Increased sputum production
- Increased purulence of sputum

Mild (and no pneumonic changes)

Doxycycline 200mg PO OD **[not suitable in pregnancy]**

Failed treatment with doxycycline in previous month or x-ray changes suggestive of pneumonia see below

48 -72hr hour review

Clinical improvement

Continue for 5 days and stop

Clinical deterioration

Escalate as per below

Moderate – Severe and/or pneumonic changes on imaging

No history of pseudomonas infection/colonisation:

Co-amoxiclav 625mg PO TDS (IV 1.2g TDS if severe/unable to tolerate PO)

Levofloxacin 500mg PO BD (IV 500mg BD if severe/unable to tolerate PO)

48-72 hours review

Clinical improvement

Switch to PO (if on IV) complete 7 (10days in severe disease or slow to respond)

Clinical deterioration

Escalate as below & Discuss with micro

History of pseudomonas colonisation/infection:

Piperacillin-tazobactam 4.5g IV TDS (discuss sensitivity with micro)

CefTAZIDime 2g IV TDS **or**
Ciprofloxacin 500mg PO BD (IV 400mg BD) (discuss sensitivity with micro)

48-72 hours review

Clinical improvement

Chase MC&S for PO option

Complete 7 days therapy (10days in severe disease or slow to respond)

If clinical deterioration

Discuss with micro

LOWER RESPIRATORY TRACT

HOSPITAL ACQUIRED PNEUMONIA (HAP)

	FIRST LINE THERAPY	ALTERNATIVE OPTION
Common pathogens: *Staphylococcus aureus, streptococcus specie,* Gram –VE organisms (including) *pseudomonas, acinetobacter* species Clinical features; 1. CXR show new or progressive pulmonary infiltrates plus at least two of the following: 2. Fever > 38 C 3. Leucocytosis or leukopenia 4. Purulent sputum 5. Decline in oxygenation **Notes:** 1. Review the chest x-ray; unlikely HAP if there is no radiological confirmation 2. Review past microbiological culture and sensitivity results to guide antibiotic choice **3.** Send sputum or other lower respiratory tract samples for culture, if possible **Review clinical progress daily; reconsider antibiotic choice and route according to clinical progress and culture results.** **There are no current published criteria for assessing severity. The following features would suggest severe pneumonia, but these may be present due to underlying disease or other cause, eg. sepsis** 1. **RR≥22** 2. **GCS<13** 3. **SBP≤100mmHg** 4. **Bilateral or multi-lobular CXR shadowing** 5. **Hypoxia (Sao2 <92%)** 6. **Need for ventilator support**	**ADMISSION <5 DAYS - SEE CAP PROTOCOL** **MILD** **Doxycycline** 200mg PO OD **MODERATE** **Co-amoxiclav** 625mg PO TDS (1.2g IV TDS if not absorbing/able to swallow) **If MRSA colonised;** Consider the addition of **linezolid** 600mg PO BD (near 100% bioavailability) **If IV required: Teicoplanin** (dose as per trust guideline) **48-72 hours review** ***Clinical improvement*** • Complete 5 days therapy (PO step down if on IV) • If slow initial response (febrile in last 24 hours / O_2 support), continue IV and review if suitable for oral every 24 hours. Complete 7 days. ***Clinical deterioration*** • Discuss with a microbiologist / chase microbiology results **SEVERE (OR RECENT BROAD SPECTRUM ANTIBIOTIC FAILURE OR PSEUDOMONAS RISK*)** **Pseudomonas risk patients: Recent ITU admission +/- invasive procedure, Structural lung disease (e.g. Bronchiectasis), known pseudomonas colonised, severely immunocompromised, Haem / Oncology patients* **Piperacillin-tazobactam** 4.5g IV TDS **If MRSA colonised;** Consider the addition of **linezolid** 600mg PO BD (near 100% bioavailability) If IV required: **Teicoplanin** (dose as per trust guideline) **48-72 hours review** ***Clinical improvement*** • Consider PO step down below, complete 5 days therapy. • If slow initial response (febrile in last 24 hours / O_2 support), complete 7 days • PO option (check cultures): **ciprofloxacin** 500mg BD +/- **doxycycline** 200mg OD ***Clinical deterioration*** • Discuss with micro • Consider collection or other source	**Doxycycline** 200mg PO **Levofloxacin** 500mg PO OD (IV if not absorbing/able to swallow) **CefTAZIDime** 2g IV TDS **OR** **Ciprofloxacin** 400mg IV BD *plus* **linezolid** 600mg PO BD (near 100% bioavailability) If IV required: **Teicoplanin** (dose as per trust guideline)

LOWER RESPIRATORY TRACT

SUSPECTED / CONFIRMED COVID-19

There is no observed pre-diliction for particular secondary bacterial infection with possible or confirmed COVID-19. The main value of antimicrobial agents is to treat bacterial pneumonia either before the COVID-19 test result is available or because of suspected co-infection. Evidence so far suggests bacterial co-infection occurs in **less than about 10%** of patients with COVID-19. Patients in critical care have an increased likelihood of bacterial infection.

HIGH clinical suspicion of COVID-19

- The following characteristics **may** feature:
  - Lymphopenia
  - Severe myalgia
  - Loss of sense of smell (anosmia)
  - Patient is breathless but has no pleuritic pain
  - Bilateral chest X-ray changes (see below)
  - Cough
  - Persistent fever

Be aware 3 patterns on CT-chest imaging consistant with COVID-19 according to stage of illness (from symptom onset)
Early (0-2 days): normal or rounded ground glass opacities
Intermediate (5-10 days): crazy-paving opacities
Late (>10 days): consolidation
Chest imaging changes are bilateral in >60% of patients, with the lung periphery and lower lobes being most involved. Early ground glass appearances may not be visible on CXR.

Send samples:
- COVID-19 viral swab for PCR
- Consider influenza viral swab for PCR if appropriate.

If COVID-19 alone is confidently suspected **ANTIBIOTICS ARE NOT INDICATED.** Where there is doubt antibiotics should be given but must be reviewed at 24-48 hours.

Suspected COVID-19 + co-existing bacterial infection

Consider bacterial infection when:
- Clinical/radiological evidence of lobar pneumonia
- New neutrophilia > 7.5 x 10^9/L
- Cough productive of yellow/green sputum
- Patient has pleuritic pain

Send samples:
- COVID-19 viral swab for PCR
- Sputum samples for MC&S
- Urine for pneumococcal and legionella antigen
- Mycoplasma serology
- Blood cultures if severe pneumonia suspected.
- Consider influenza viral swab for PCR if appropriate.

Prescribe antibiotics: as per 2nd page.

24 – 48 hour review:
If there are no signs of a secondary bacterial infection **antibiotics should be stopped.** (Persistant fever and elevated CRP are consistant with COVID-19 alone.)

LOWER RESPIRATORY TRACT	FIRST LINE THERAPY	ALTERNATIVE OPTION
SUSPECTED / CONFIRMED COVID-19 + ADDED BACTERIAL PNEUMONIA		
USE THE PATHWAY ABOVE AS A GUIDE TO SIGNS OF ADDITIONAL BACTERIAL INFECTION. REVIEW EACH PRESCRIPTION AT 24-48HRS AND STOP WHERE APPROPRIATE.		
COMMUNITY ACQUIRED NOTE THAT CURB-65 SEVERITY SCORE HASN'T BEEN VALIDATED IN PATIENTS WITH COVID-19.	**Mild – Moderate CAP** **Amoxicillin** 1g PO TDS (or IV 2gTDS) +/- **Doxycycline** 200mg PO OD	**Mild CAP** **Doxycycline** 200mg PO OD.
	Severe CAP **Co-amoxiclav** 1.2g IV TDS *plus* **doxycycline*** 200mg PO OD (*or **clarithromycin** 500mg IV BD if NBM or not absorbing)	**Moderate – Severe CAP** **Ceftriaxone** 2g IV OD + **Doxycycline** 200mg PO OD* (*or **Clarithromycin** 500mg BD IV if NBM or not absorbing) **Beta-lactam free regime** **Levofloxacin** 500mg IV/PO BD
	48-72 hour review **Signs of bacterial infection?** No – stop antibiotics Yes & improvement – PO switch (if appropriate) Complete 5 days treatment	**48-72 hour review** **Signs of bacterial infection?** No – stop antibiotics Yes & improvement – PO switch (if appropriate) Complete 5 days treatment
HOSPITAL ACQUIRED	**Mild HAP** **Doxycycline** 200mg OD	**Mild HAP** **Doxycycline** 200mg OD
	Moderate HAP **Co-amoxiclav** 625mg PO TDS (1.2g IV TDS if not absorbing / able to swallow	**Moderate HAP** **Levofloxacin** 500mg IV/PO BD
	Severe HAP (or recent broad spectrum failure of pseudomonas risk) **Tazocin** IV 4.5g TDS	**Severe HAP** **Ceftazidime** 2g IV TDS **Beta-lactam free regime** **Ciprofloxacin** 400mg IV BD plus **Linezolid** 600mg PO BD
	48-72 hour review **Signs of bacterial infection?** No – stop antibiotics Yes & improvement – PO switch (if appropriate) Complete 7 days treatment	**48-72 hour review** **Signs of bacterial infection?** No – stop antibiotics Yes & improvement – PO switch (if appropriate) Complete 7 days treatment

SKIN AND SOFT TISSUE

CELLULITIS

Clinical classes of cellulitis and recommended laboratory investigations

Cellulitis is nearly always unilateral in the absence of trauma, if diagnosing bilateral cellulitis please consider other indication

	Class I	Class II	Class III	Class IV
Classification of Cellulitis	Patients have no signs or symptoms of systemic toxicity, have no uncontrolled co-morbidities and can usually be managed with oral anti-microbials on an out-patient basis.	Patients are either systemically ill or systemically well but with a co-morbidity such as peripheral vascular disease, chronic venous insufficiency or morbid obesity which may complicate or delay resolution of their infection.	Patients may have a significant systemic upset such as acute confusion, tachycardia, tachypnoea, hypotension, or may have unstable co-morbidities that may interfere with a response to therapy or have a limb-threatening infection due to vascular compromise.	Patients have sepsis syndrome or severe life-threatening infections such as necrotizing fasciitis.
Laboratory Investigations		FBC, CRP, U+E Culture any skin break / ulceration / blister fluid +/- Blood cultures if pyrexial +/- Skin biopsy where differential diagnosis includes non-infectious inflammatory lesions		

SKIN AND SOFT TISSUE

FIRST LINE THERAPY

ALTERNATIVE OPTION - FIRST LINE IF KNOWN MRSA

CELLULITIS

Common Pathogens:

Beta-haemolytic Group A Streptococcus (Strep. pyogenes), Staphylococcus aureus

Exclusions:

Lower limb cellulitis in diabetics – see separate guidance

Notes:

a. Cellulitis is nearly always unilateral in the absence of trauma
b. For hospital patients, remove venflon/central line if line-associated cellulitis.
c. Draw demarcation lines to follow progress Send wound swab if broken skin
d. Check for previous MRSA results
e. Bites or those with diabetes : see separate guidance

Common pathogens:

Necrotising fasciitis: Beta-haemolytic Streptococci (usually group A)
Fournier's gangrene: polymicrobial, Bacteroides fragilis & Clostridia, Peptostreptococcus spp., Streptococcus spp. & Staphylococcus spp., E.coli, Enterobacter & Pseudomonas, Klebsiella & Proteus
Synergistic gangrene: polymicrobial infection, beta-haemolytic streptococci Group A, Staphylococcus aureus, Gram - negative aerobes, anaerobes
Gas gangrene: Clostridium perfringes

Notes:

a. Take tissue sample from the non-necrotic side of the wound margin before starting treatment – this is essential for accurate diagnosis and for guiding appropriate antibiotic treatment
b. Early intervention is mandatory. Do not wait for microbiology results before commencing empirical treatment

ITU

Use continuous **vancomycin** infusion in place of **teicoplanin**

Class I - Mild Cellulitis (No systemic symptoms)

Flucloxacillin 1g PO QDS

Doxycycline 200mg PO OD

Duration: 5 days and review

Class II/III – Moderate/Severe Cellulitis (incl. Systemic symptoms)

Flucloxacillin 2g IV QDS

Cellulitis associated with clinical signs of septicaemia / septic shock: Add **clindamycin** 1.2g IV QDS for 48-72hours

Teicoplanin *(see dosing guide)* IV

Cellulitis associated with clinical signs of septicaemia / septic shock: Add **clindamycin** 1.2g IV QDS for 48-72hours

Note: If extensive, spreading rapidly or systemic illness discuss with a microbiologist

48-72 HOURS REVIEW

Clinical improvement

Base on pain, heat and inflammatory markers (redness can be slower to respond).
IV-PO switch should be guided by sensitivities. If no microbiology available empirical options are:

IV to oral switch **flucloxacillin** 1g PO QDS

IV to oral switch **clindamycin** 450mg PO QDS (600mg QDS in patients >80kg))
If MRSA positive, chase sensitivities for PO options with micro

Duration: Complete 7-10 days total course

Clinical deterioration

Chase MC&S, discuss with micro and consider deep seated infection

Class IV – ***Necrotising Infections***

This should be treated as a medical emergency; refer urgently for surgical review / debridement. All cases should be discussed with a microbiologist as soon as possible

Piperacillin-tazobactam 4.5g IV TDS
+ **clindamycin** 1.2g IV QDS
+ **gentamicin** IV (see trust guide)
+ **teicoplanin** IV (see trust guide)

Ciprofloxacin 400mg IV TDS
+ **clindamycin** 1.2g IV QDS
+ **gentamicin** IV (see trust guide)
+ **teicoplanin** IV (see trust guide)

+ Urgent surgical review and debridement
+ Discuss with microbiologist immediately

Review at 72 hours and discuss rationalisation with micro. **Clindamycin** must not be continued beyond 72 hours without microbiology advice.

SKIN AND SOFT TISSUE

	FIRST LINE THERAPY	ALTERNATIVE OPTION
BITES (HUMAN AND ANIMAL)		
Common pathogens: • *Pasteurella multocida (animals),* Beta-haemolytic streptococci, *Staphylococcus aureus,* Anaerobes **Notes:** a. Cleanse wound thoroughly b. Consider tetanus immunoglobulin (with absorbed tetanus vaccine if necessary according to immunisation history) c. Assess HIV / hepatitis B & C risk d. Assess tetanus & rabies risk – for dog / cat bites e. Surgical toilet is most important f. Antibiotics advised for: puncture wound, bite involving hand / foot / face / joint / tendon / ligament, immunocompromised, diabetic, asplenic, hx. of prosthetic valve or bite proximal to prosthetic joints	**Co-amoxiclav** 625mg PO TDS **or** IV option **only if severe skin damage or systemically unwell**: **Co-amoxiclav** IV 1.2g TDS	**Doxycycline** 200mg PO OD +**metronidazole** 400mg PO TDS **If severe skin damage or systemically unwell**: **Ciprofloxacin** PO 500mg or IV 400mg BD + **clindamycin** PO 300-600mg or IV 600-1200mg QDS (both have very good PO bioavailability 80-90%)
	Duration: Treatment 7-10days Prophylaxis 5-7 days	
	Antibiotics are not generally needed if the wound is more than 3 days old and there is no sign of local or systemic infection.	
PERIANAL ABSCESS		
Notes: a. **<u>Only treat with antibiotics if surrounding cellulitis present</u>**. b. Drainage should always be attempted.	**Co-amoxiclav** 625mg PO TDS	**Doxycycline** 200mg PO OD + **metronidazole** 400mg PO TDS
	Duration: Treatment 5-7 days	

DIABETIC FOOT INFECTIONS

- Diabetic foot infections require careful attention and co-ordinated management, preferably by a multidisciplinary foot care team.
- Antibiotics should only be used in those with clinical signs of infection.
- The choice and route of antibiotic should depend on the severity of the infection.
- Empirical treatment is based on targeting the organism presumed to be involved.
- Diabetic feet are complex and often poly microbial, cultures should always be sent. Common pathogens include staph aureus, enterococcus, coliforms and anaerobes.
- This guidance assists the clinicians treating the patient until microbiological results are available. The choice of antibiotic should then be amended according to the microbiological results.

Initial assessment

- Clean, debride and probe wound
- Determine depth and tissues involved.
- Routine bloods, including WCC, CRP, ESR, HbA1c
- Assess neuropathy, foot deformity, calluses, ulceration, cellulitis, tissue necrosis and sensation.
- Assess ischaemia and evidence of inflammation.
- The following should be sent for culture, prior to starting antibiotics without delay.
  1. Curettage or tissue scraping
  2. Aspirate of purulent secretions
  3. Piece of surgically obtained tissue
- In the absence of above deep swab may be taken – this practice is not recommended due to the risk of contamination with commensal organisms.

NB. Superficial swabs are NOT useful except in the surveillance of antibiotic resistant flora

Send MRSA screen on all open wounds.

- X-ray foot (if osteomyelitis is suspected but not confirmed by initial x-ray, consider an MRI to confirm the diagnosis.
- Document severity score using SINBAD, as right. (SINBAD scoring is used in the ongoing National Diabetes Footcare Audit NDFA.)
- **Commence empirical antibiotics according to the table below. Take into consideration recent antibiotic use, MRSA or other resistant organisms**.
- Remove any pressure off the lesion i.e. elevation of the foot, frame or crutches to mobilise
- Daily dressings
- Wound healing and neutrophil function is impaired with hyperglycaemia. Therefore:
  1. T2DM sub optimally controlled with oral hypoglycaemic agents should be prescribed insulin.
  2. Treat hypertension and hyperlipidaemia
  3. Patients should stop smoking.

SINBAD classification and scoring system

	Score
Site	
Forefoot	0
Midfoot or hindfoot	1
Ischaemia	
Pedal blood flow intact: at least 1 pulse palpable	0
Clinical evidence of reduced pedal blood flow	1
Neuropathy	
Protective sensation intact	0
Protective sensation lost	1
Bacterial infection	
None	0
Present	1
Ulcer depth	
<1cm^2	0
≥1cm^2	1
Depth	
Ulcer confined to skin and subcutaneous tissue	0
Ulcer reaching muscle, tendon or deeper	1
Total possible score	**6**
A score of ≥3 is associated with delayed ulcer healing	

First review

- If new ulcer and suspected infection refer to the Foot Protection Team / Vascular Team within 48 hours. The foot protection team will clean the wound, drain pus, remove slough and non-viable tissue. They will assess vasculature and make recommendations regarding dressings and pressure relieving footwear
- If critical leg ischaemia **Refer to Vascular Surgeons**
- If neuropathic foot with spreading infection, osteomyelitis or dead tissue that requires debridement/ amputation, **refer to Vascular surgeons and send bone for MC & S.**

DIABETIC FOOT INFECTIONS

Always check for previous wound swab results.

MRSA: Diabetic foot infection patients with a previous history of MRSA should be considered to have MRSA infections and therefore prescribers should ensure **teicoplanin** is included in the regime or an oral alternative the patients strain has shown susceptibility to. Suspect MRSA infection in patients with recent hospital admission, healthcare workers and residence in a nursing home **and chronic wounds.**

	FIRST LINE THERAPY	ALTERNATIVE OPTION
	Available published evidence does not support the use of antibiotics for the management of clinically uninfected ulcerations, either to enhance wound healing or as prophylaxis against infection	
Mild Infection limited to skin or subcutaneous tissue **AND** Any cellulits / erythema ≤2cm around the ulcer and / or ≥2 signs of pus, erythema, warmth, pain or tenderness, swelling or induration **AND** No evidence of systemic infection	**Doxycycline** 200mg PO OD + **metronidazole** 400mg PO TDS	
Moderate Infection involving deeper structures (such as fascia, tendon, bone, joint, abscess, etc.) OR cellulitis / erythema >2cm and no systemic inflammatory response.	**Co-amoxiclav** 1.2g IV TDS	**CefTRIAXone** 2g IV OD + **metronidazole** 400mg PO TDS + **teicoplanin** *(see local dosing guide)* (**In severe allergy replace cefTRIAXone** with **ciprofloxacin** 500mg PO BD (**ciprofloxacin** and **metronidazole** should only be given IV if concerns regarding absorption)
Severe Any infection in a patient with signs of systemic inflammatory response including systemic toxicity or metabolic instability (e.g. fever, chills, tachycardia, hypotension, confusion, leucocytosis, acidotic, severe hyperglycaemia or uraemia	**Co-amoxiclav** 1.2g IV TDS + **teicoplanin** *(see local dosing guide)* + **gentamicin** STAT IV *(see local dosing guide)*	Moderate allergy **CefTRIAXone** 2g IV OD + **metronidazole** 400mg PO TDS + **teicoplanin** *(see local dosing guide)* + **gentamicin** STAT IV *(see local dosing guide)* **In severe allergy replace CefTRIAXone** with **ciprofloxacin** 500mg PO BD (**ciprofloxacin** and **metronidazole** should only be given IV if concerns regarding absorption)

48-72h review :

- If any clinical suspicion of bone involvement imaging should be done to confirm.
- If osteomyelitis ruled out and patient systemically well IV-PO switch should be done as guided by cultures if no cultures available suggest regimes are: **Co-amoxiclav** 625mg PO TDS OR **ciprofloxacin** 500mg PO BD + **metronidazole** 400mg PO TDS .

Duration: Continue antibiotics until there is evidence that the infection has resolved but not necessarily until the wound has healed

- Suggestions for duration of antibiotic therapy: mild infections 1-2 weeks, but some may need an additional 1-2 weeks, for moderate to severe, usually 2-4 weeks is sufficient
- For osteomyelitis 4-6 weeks is required, a shorter duration is required if the entire infected bone is removed, longer duration if the bone remains. Minimum of 2 weeks with IV antibiotics or a suitable oral antibiotic with high bioavailability.
- Ensure follow up with the foot protection team within 48 hours of discharge, also with diabetologists ± surgeons
- Ensure of appropriate treatment of glucose, lipids, blood pressure and antiplatelets

SUSPECTED URINARY TRACT INFECTION Full DoH guidelines

Male <65
Urine dip, send MSU and treat immeadiately as per guidance consider other causes including STI

Female - Preganant
See separate obstetrics pathway: Link

Female–Not preganant <65
No signs of sepsis

Urine dip - 2/3 positive of:
Leucocytes, nitrites , RBC
Send MSU - **Consider delayed prescription or if symptoms severe start abx as per Uncomplicated UTI guidance**

Urine dip - <2 positive of:
Leucocytes, nitrites or RBC
Look for other causes of symptoms incl. STI consider delayed prescription

Management in ≥65 male or female

No catheter in situ

Upper UTI symptoms:
- Flank pain and Rigors
- Lower UTI symptoms + patient is systemically unwell

Urosepsis/upper UTI likely
Send pre abx MSU +/- blood cultures
Start abx as per Urosepsis guidance consider previous microbiology

Lower UTI symptoms:
New onset Dysuria alone
OR ≥2 of follow:
- *Temperature 1.5°C above normal*
- *New frequency or urgency*
- *Visible haematuria*
- *Suprapubic tenderness*
- *New/worse incontinence*
- *New/worse delirium/debility*

Do NOT urine dip

No

UTI unlikely
Check for other causes of symtpoms

Yes

Do NOT urine dip

Consider and investigate other cause of symptoms
Check WCC and CRP for supportive evidence of infection
Send MSU and assess clinical need for abx*

No other causes identified
Start abx as per Uncomplicated UTI guidance

Catheterised patient

Do NOT urine dip

≥1 symptom?
- Rigors/fever
- Acute haematuria
- Flank tenderness
- New/worsening confusion

AND
No other more likely source of infection

Yes

caUTI likely
Send pre abx CSU +/- blood cultures
Do not Dipstick
Change catheter ASAP Treat as per catheter associated UTI

No

UTI unlikely
Do not Dipstick
Do not send CSU

***Asymptomatic* bacteriuria - Only treat prior to urological procedures or in pregnancy.**
Positive cultures do not distinguish between asymptomatic bacteriuria and UTI :

Elderly patients:
- 30% of patients >65years old will have positive micro even when no infection present.
- 50% of nursing home residents - there is a 30% -50% chance that a febrile patient in long term care will have positive urine cultures regardless of the cause of their fever

Catheterised patients:
- Near 100% of patients with long term catheters will have growth - ONLY perform a CSU if costovertebral tenderness, rigors, new onset of delirium or fever

$Urine dips
- Catheter urine is positive in >95% of cases even when no infection present. NEVER urine dip a catheter urine, send a CSU if high clinical suspicion.
- >50% of ≥65yo will have a positive urine dip do not use a sole diagnostic tool
- A negative urine dip has a very high negative predictive value >90%[1]

URINARY TRACT

UNCOMPLICATED LOWER UTI TREATMENT

Exclusions:

- Pregnancy
- Catheter associated infection
- Pyrexia >38◦c (suggests systemic infection) or pyelonephritis
- Those antibiotics marked with $ are not suitable for treatment of upper urinary tract infections (pyelonephritis)

Common pathogens:

- *Escherichia coli* (~80% of community acquired), *Klebsiella, Staphylococcus saprophyticus, Proteus spp., Enterococci spp.*

Notes:

a) Resist rates to Gram negative coliforms are rising locally. Empiric therapy now provides less assurance of microbial cover. Urine must be tested in all previously treated, complicated or hospital acquired UTIs

b) In the absence of pregnancy, asymptomatic bacteriuria should NOT be treated with antibiotics

$ **Trimethoprim**, **nitrofurantoin, Pivmecillinam** and **fosfomycin** PO are unsuitable therapies for systemic infection

*****Rule out STI if patient is sexually active*****

		Therapy (oral)	Duration		Comment
			Women	Men	
Empiric Therapy	**1st Line**	**Nitrofurantoin**$ 50mg QDS	3 days	7 days **Avoid** if chance prostate source	**Avoid if CrCl < 45ml/min due to risk of treatment failure**
	2nd Line	**Pivmecillinam**$ 400mg PO TDS	3 days	7 days [Reduce dose to 200mg TDS from day 4]	**Contains penicillin**
	3rd Line	**Fosfomycin**$ 3g stat	Single dose	Every 48hrs* for 3 doses	**Dissolve sachet in a cup of water to reconstitute** ***72hrs if CrCl <50ml/min**
	Preferred option	**Trimethoprim**$ 200mg BD	3 days	7 days	**Caution in patients with AKI or CrCl <20ml/min**
		Nitrofurantoin$ 50mg QDS	3 days	7 days Avoid if chance prostate source	**Avoid if CrCl < 45ml/min due to risk of treatment failure**
		CefaLEXin 500mg TDS	3 days	7 days	**Caution in elderly patients or those at risk of *c.difficile* infection**
		Fosfomycin$ 3g stat	Single dose	Every 48hrs* for 3 doses	**Dissolve sachet in a cup of water to reconstitute** ***72hrs if CrCl <50ml/min**
		Pivmecillinam $ 400mg PO TDS	3 days	7 days	**Contains penicillin [Reduce dose to 200mg TDS from day 4]**
		Co-amoxiclav 625mg TDS	3 days	7 days	**Caution in elderly patients or those at risk of *c.difficile* infection**
	Last-line option	**Ciprofloxacin** 500mg BD	3 days	7 days	**Caution in elderly patients or those at risk of *c.difficile* infection**

URINARY TRACT

FIRST LINE THERAPY | ALTERNATIVE OPTION

ACUTE PYELONEPHRITIS / UROSEPSIS

****Recent failed therapy or contraindication to amikacin****
Discuss with a microbiologist for advice

Common pathogens:

- *Escherichia coli* (70 - 80%)
- *Klebsiella pneumoniae, Proteus mirabilis,* Enterococci

Notes:

a) Send urine culture / sensitivities prior to treatment – local resistant rates are increasing, vital to ensure appropriate therapy
b) Evaluate for obstruction
c) Patients who are more likely to develop urosepsis include: elderly patients; diabetics and immunosuppressed patients
d) If patient has had an ESBL organism cultured within the past 12 months give **meropenem** IV 1g TDS + **amikacin** STAT if unstable. And ENSURE a urine sample sent prior to antibiotics.
e) If the patient has a history of carbapenem resistance please discuss with a microbiologist.
f) **Trimethoprim**, **nitrofurantoin** and **fosfomycin** PO are unsuitable therapies for systemic infection

Amikacin IV STAT *(see local dosing guide)*
Maximum 72 hours
Plus **cefTRIAXone** IV 2g OD

Amikacin IV STAT *(see local dosing guide)*
Maximum 72 hours
Plus **ciprofloxacin** IV 400mg BD (or PO 500mg BD)

48-72 hour review:

Apyrexial, no evidence of collection, clinically well: De-escalate to oral option as per sensitivities
Empirical options:
Co-amoxiclav PO 625mg PO TDS
Ciprofloxacin PO 500mg PO BD
Duration: 10-14 days if imaging displays no collection/deep source

Inadequate clinical response / poor source control
Discuss with microbiologist, chase MC&S and continue with IV therapy, discussion with urology and imaging

Haemodynamically unstable : Continue **amikacin** and discuss with a microbiologist
Chase MC&S and continue with IV therapy, discussion with urology and imaging

IV-PO switch once source controlled and apyrexial for 36 hours. Step down as per cultures or guided by a microbiologist. Complete a total 14 days if imaging displays no collection/deep source

CATHETER ASSOCIATED URINARY INFECTION

Notes:

a. Bacteriuria is not in itself an indication for antibiotics, as most urinary catheters become colonised, and no intervention is suggested in asymptomatic patients with free-flowing catheters. Treat if manipulation of catheter is planned or if clinical evidence of infection is present
b. A clearly marked CSU and blood cultures should always be obtained prior to the administration of antibiotics when the patient has systemic symptoms (fever, rigors etc.)
c. To reduce contamination when collecting a sample: using aseptic technique, drain a few mL of residual urine from the tubing, then collect a fresh sample from catheter sampling port

******Antimicrobial therapy is not indicated unless the patient has evidence of systemic infection and urinary tract is a likely source******

Remove or change of catheter with **amikacin** STAT IV *(see local dosing guide)*

Further treatment may not be necessary, if further treatment is required see urosepsis guidelines.
Duration:
7 days (if prompt resolution of symptoms)
10–14 days (if delayed clinical response) - Consider prostate involvement if recent traumatic catheterisation

GENITOURINARY

	FIRST LINE THERAPY	ALTERNATIVE OPTION

PELVIC INFLAMMATORY DISEASE (PID)

Common pathogens: *Chlamydia trachomatis* (50%), *Neisseria gonorrhoeae,* Mycoplasma spp., Anaerobes, *Gardnerella vaginalis* **Notes:** a. Collect endocervical swab for Chlamydia NAAT and GC culture b. **Treatment should be initiated without waiting for the results** of culture and susceptibility; delay increases severity and risk of long term sequelae c. The absence of endocervical or vaginal pus cells has a good negative predictive value (95%) for a diagnosis of PID but their presence is non-specific (poor positive predictive value – 17%). d. Previous GU clinic attendance increases likelihood of Chlamydia or Gonococcal infection e. PID can be secondary to appendicitis or diverticulitis, following IUCD insertion (the highest risk of developing PID is within the first 4-6 wks) f. Refer to Sexual Health for contact tracing g. Surgical drainage of a tubal abscess may be necessary if antibiotics are started late and symptoms fail to resolve completely h. A diagnostic laparoscopy may be required if the signs and symptoms are not resolving within 48 hours i. Instruct patient to avoid sex until 7 days post treatment and any exposed partners have been treated j. **All patients must have a pregnancy test** ***These guidelines should be used in conjunction with the BASHH guidelines. Please refer to BASHH guidelines for full treatment advice (link)***	**Outpatient Management** **CefTRIAXone** Intramuscular 1g single dose + **doxycycline** 100mg PO BD for 14 days + **metronidazole** 400mg PO BD for 14 days **Alternative in <u>pregnancy:</u>** Intramuscular **cefTRIAXone** 1g single dose + **erythromycin** 500mg PO BD *plus* **metronidazole** 400mg PO BD (for 14 days) **Inpatient Management** **cefTRIAXone** 2g IV OD **(until 24 hours afebrile)** + Oral **doxycycline** 100mg BD for 14 days + Oral **metronidazole** 400mg BD for 14 days	**Outpatient Management** **Ofloxacin** 400mg PO BD for 14 days + **metronidazole** 400mg PO BD for 14 days **Inpatient Management** **Clindamycin** 900mg IV TDS + **gentamicin** IV *(see local dosing guide)* Followed by: **Doxycycline** 100mg PO BD to complete 14 days + **metronidazole** 400mg PO BD to complete 14 days

CHRONIC BACTERIAL PROSTATITIS

	Seek urological or GU Medicines advice before commencing treatment. Precise diagnosis needs confirmation before appropriate management can be given

GENITOURINARY

	FIRST LINE THERAPY	ALTERNATIVE OPTION
ACUTE BACTERIAL PROSTATITIS		
Common pathogens: *Escherichia coli* (50-75%), Other enterobacteriaceae, Enterococcus sp. **Notes:** a. Many cases of 'prostatitis' are not infective (only about 5% are bacterial) b. Send MSU for MC&S, prior to treatment wherever possible c. Send blood culture if pyrexia ≥38°C present d. If pyrexia continues past 36hours consider abscess e. Also consider need for antipyretics, analgesics, stool softeners, bed rest and adequate hydration Consider additional testing for gonorrhoea , chlamydia , and trichomoniasis in at risk sexually active young men. If STI identified, please contact consultant microbiologist or GUM consultants for advice. **Always review previous to starting antimicrobial cultures. If history of ESBL Meropenem is a suitable empiric agent. Cultures must be sent to guide step-down therapy.**	**Non- severe** **Co-trimoxazole** 960mg PO BD 14days *(not suitable in sulphur allergy)* **If sepsis / haemodynamically unstable:** **Gentamicin** *(see local dosing guide)* IV for 24-72hours + **cefTRIAXone** 2g IV OD **48-72h review:** Apyrexial improving inflammatory markers PO as guided by cultures *Empirical option* : **Co-trimoxazole** 960mg PO BD *(not suitable in sulphur allergy)* **Duration:** complete 3-4 weeks **Ongoing pyrexia** – exclude abscess discuss with a microbiologist	**Ciprofloxacin** 500mg PO BD 14days **If sepsis / haemodynamically unstable:** **Gentamicin** *(see local dosing guide)* IV 24-72hours + **ciprofloxacin** 400mg IV TDS **48-72h review:** Apyrexial improving inflammatory markers PO as guided by cultures *Empirical option :* **Ciprofloxacin** 500mg PO BD **Duration:** complete 3-4 weeks **Ongoing pyrexia** – exclude abscess discuss with a microbiologist
EPIDIDYMO-ORCHITIS		

Common pathogens: *Enterobacteriaceae* and Coliforms (Men >35yrs), *Neisseria gonorrhoeae* (Men <35yrs), *Chlamydia trachomatis* (Men <35yrs) **Notes:** a. Exclude testicular torsion and tumour b. Refer to urology and Sexual Health as often of chlamydial origin c. Complete sexual history taking is imperative (Men who engage in insertive anal intercourse are at risk of epididymitis secondary to sexually transmitted enteric organisms) d. Consider tuberculous epididymo-orchitis in patients from high prevalence countries or with a previous history of tuberculosis and particularly in patients with immunodeficiency ***These guidelines should be used in conjunction with the BASHH guidelines. Please refer to BASHH guidelines for full treatment advice (link)***	**Sexually active / risk of STI (non-enteric source):** Intramuscular **cefTRIAXone** 1g single dose *Plus* **doxycycline** 100mg PO BD for 10 - 14 days **Low Risk of STI / elderly gentlemen / enteric source:** **Ciprofloxacin** 500mg PO BD for 10 -14 days *Or* **doxycycline** 100mg PO BD for 10 - 14 days **If sepsis / haemodynamically unstable:** Add **gentamicin** *(*see *local dosing guide)* IV for 24-72hours Continue **cefTRIAXone** 2g IV OD until apyrexial for 24 hours then continue as above.	**Ciprofloxacin** 500mg PO BD for 10 -14 days *Or* **doxycycline** 100mg PO BD for 10 - 14 days *(n.b N. gonorrhoeae: doxycycline does not cover and increasing prevalence of resistance to quinolones)* **If sepsis / haemodynamically unstable:** Add **Gentamicin** *(*see *local dosing guide)* IV for 24-72hours Give **ciprofloxacin** 400mg IV until apyrexial for 24 hours then continue as above.

6 TRAINING

Medical staff will receive training on the guidelines during trust induction. A mobile app is planned for launch. FY1 doctors are required to pass a mandatory test on general prescribing, including some questions on antibiotics. There is also a mandatory e-learning session for them to complete. Pharmacists and nursing staff will receive training during induction and routine training sessions.

The guidelines will be disseminated to all wards and departments of the trust. There will be intranet alerts and presentations at clinical governance and grand round meetings to facilitate dissemination. The guidelines will be accessible to all staff on the trust intranet.

6.1 EQUALITY IMPACT ASSESSMENT

The Equality Impact Assessment for this policy is attached in Appendix A.

7 MONITORING COMPLIANCE

Compliance with antimicrobial choice is audited quarterly. Results are fed back to Directorates. Each speciality and/or directorate should devise and implement an action plan for improving performance if / when necessary.

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Malaria

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9 Associated Documentation

- Guidelines for Antibiotic Prophylaxis in Surgery in Adults
- Antimicrobial stewardship policy.
- Clostridium Difficile Guidelines
- Trust Infection Control Policy
- MRSA Care Pathway
- Hand Hygiene Guidelines
- Antibiogram 2019 (Dr Qureshi)
- Adult antibiotic therapeutic dosing and monitoring guideline
- Paediatric antibiotic guidelines

10 VERSION HISTORY TABLE

Version	Date	Author	Ratified by	Comment/Reason for change
	1995	South West Thames Regional Guidelines Unit, St George's Hospital		Antibiotics included in the Guidelines for the Management of Common Medical Emergencies and the use of Antimicrobial Drugs booklet (this has been considered as version 1)
2	September 2005	Antibiotic Steering Group	Medicines Management Committee	Stand- alone antimicrobial guidelines
3	September 2006	Antibiotic Steering Group	Medicines Management Committee	Reduce use of Cefuroxime to reduce risk of C.difficile. Replaced use of cefuroxime with Tazocin
4	January 2007	Antibiotic Steering Group	Medicines Management Committee	National shortage of Tazocin
5	October 2007	Antibiotic Steering Group	Medicines Management Committee	Reduce use of ciprofloxacin More detailed
6	April 2008	Antibiotic Steering Group and Co	Medicines Management Committee	Reduce C.difficile by reducing use of cephalosporin, quinolones and imipenem Included detailed treatment of C.difficile Included treatment of common surgical infections Production of pocket size version and ward posters
7	December 2010	M Twagira M Sahathevan H McGowan	Integrated Governance and Clinical Governance Committee	Due for review Expanded coverage
8	August 2011			
8.1	October 2012	M Sahathevan H McGowan	Medicines Management Committee	Page 16 &17 – Update of the risk factors for ESBL producing bacteria. The only patients to be considered at risk of ESBL for empiric treatment are those with an ESBL +ve result from any site in the previous 24 months. Urosepsis – 1st line treatment Tazocin + Gentamicin 5mg/kg stat dose
8.2	May 2013	M Sahathevan H McGowan	Medicines Management Committee (MMC)	Endocarditis – Gentamicin now BD PID – Ceftriaxone now 2g, Probenicid removed. Gentamicin updated to dose dependant weight for calculation Vancomycin – Target trough increased.

8.3	Feb 2014	M Twagira, M Sahathevan, J Hawkes-Reekie	MMC	Updated national HPA guidelines for treatment of C.difficile included. Gentamicin dosing and monitoring amended to reduce prescribing errors and risk of toxicity.
8.4	Feb 2015	H McGowan M Sahathevan	MMC	Additional information added on dosing Teicoplanin for osteomyelitis.
8.5	Dec 2015	H McGowan M. Sahathevan (Acknowledgements to Dr Arkell ST3 & Nick Cooley for contributions)	MMC	Updated endocarditis indolent choice as per BSAC. GI – intra-abdominal sepsis (incorporated indications) to Amoxicillin + Gentamicin Metronidazole. Pancreatitis statement of antibiotics not routinely indicated to be more prominent. Addition of exacerbation of Crohns / UC. C difficile declutter of additional information. Respiratory – additional different severity layers to HAP. Removal of atypical pneumonia. Sepsis of unknown origin – community acquired change to flucloxacillin + amoxicillin + gentamcin PID – update of penicillin allergy severe as per BASHH Urosepsis / pyelonephritis – ESBL & no admission required – discuss with AECC. Mild to moderate allergy, pregnant, ESBL risk – Meropenem. Severe allergy, pregnant – Gentamicin. TDM – Amikacin & Vancomycin sections updated.
8.6	May 2017	H McGowan M Twagira (& input from the ASG: Dr Wood, Nick Cooley, Dr Sahathevan & Dr Sue-Ho)	MMC	Updated in response to national shortage of Tazocin: Intra-abdominal sepsis. If CrCl <20ml/min : Cefuroxime & Metronidazole Peritonitis & Perforated DU/GI: Co-amoxiclav + Gentamicin + Metronidazole Liver abcess: Ceftriaxone 2g BD for 2/7 then OD + Amoxicillin + Metronidazole Pancreatitis: Not routinely recommended. Further advice given on when it is indicated & updated choice to Meropenem Spontaneous bacterial peritonitis: New addition. For treatment: Cefuroxime + Metronidazole + stat Gentamicin. For prophylaxis: Co-trimoxazole. Respiratory: CAP CURB65 3-5 (requiring HDU / ITU care): Co-amoxiclav + Clarithromycin. HAP: Moderate (if nil by mouth) Amoxicillin + Temocillin, Severe: Ceftazidime + Teicoplanin. VAP: new addition : Tazocin + Vancomycin. Hospital acquired sepsis: Non-ITU: Ceftriaxone + Gentamicin stat. If intra-abdominal suspected add Metronidazole. If knonw suspected MRSA add Teicoplanin. If recent ESBL positive E coli consider Meropenem. For ITU / HDU care: Tazocin. Necrotising fasciitis: Updated to Ciprofloxacin + Clindamycin + Vancomycin + Metronidazole. Diabetic foot: Pedis grade 4, soft tissue only: Ciprpfloxacin + Metronidazole + Teicoplanin. Pedis grade 4, osteomyelitis: Ciprofloxacin + Teicoplanin + Fusidic acid or Rifampicin + Metronidazole. Pyelonephritis or urosepsis: 1st line Cefuroxime OR Gentamicin, 2nd line (mild allergy) Cefuroxime OR Gentamicin, 2nd line (severe allergy) Ciprofloxacin OR Gentamicin. Acute prostatitis: Ceftriaxone +/- Gentamicin stat
9.0		H McGowan M Twagira (& input from the ASG: Dr Wood, Nick Cooley, Dr Sahathevan & Dr Sue-Ho)		
9.1	February 2019	K Heard	MMC	Removal of Therapeutic drug monitoring.

		M Twageria, Dr Qureshi, Dr Sahathevan		Separate guidelines issued.
10	April 2019	K Heard M Twageria, Dr Qureshi, Dr Sahathevan	MMC	Due for review. Updated to reduce high DDD combinations and in line with latest local antibiogram and recognised national/international guidelines.
11	October 2020	H McGowan Dr Qureshi	MMC	Due for revew. **Endocarditis – updates to wording** Modified Duke Criteria: Pathological criteria positive – One major and **Three** minor Major criteria: 'Positive echocardiogram showing oscilliating structures, abscess formation or new dehiscence of prosthetic valves OR new valvular regurgitation' Minor criteria: Pre-disposing heart disease **or IVDU** **CNS** Chloramphenicol – review dosing at **24**-48hrs to 1g QDS max (no consensus on dosing in obesity most centres reduce to 1g QDS within 24 hrs.) Cefotaxime – updated to Ceftriaxone 2g BD **C difficile** – scoring system not in IDSA or more up to date PHE guidance. To take out age and albumin and use updated markers from PHE for severe and life threatening infection. Updated name. Take out 1st recurrence as a repetition of the same treatment as 1st episode. **Respiratory** Updated references for CAP & HAP (NICE guidelines) **COVID-19** Added. Updated with NICE guidelines. Additional characteristics. CT imaging information. Consider sending flu swab. Addition of 24-48 hr review box. Antibiotics. Choice for severe c19+ severe cap updated to Co-amoxiclav (previously Tazocin as shortage of Co-amoxiclav.) **Diabetic foot** For antibiotic choice to move to mild / moderate or severe classification, as per NICE guidelines (v similar wording to the PEDIS classification.) Addition of the Sinbad classification of severity, (continual data collection for NDFA.)

APPENDIX A – EQUALITY IMPACT ASSESSMENT

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

Policy:	**Date: 17/11/15**
Officer conducting this Analysis :	

Protected Characteristic	**Positive Impact**	**Negative Impact**	**None**	**Reasons for decision**
Age			√	No difference in recommendations based on the characteristics stated. Guidelines apply to adults. Some sections include specific antibiotic choices for pregnant women. In other areas the BNF +/- specialist advice should be sought to confirm the suitability of individual drugs in pregnant women.
Disability			√	
Faith			√	
Gender			√	
Race			√	
Sexual Orientation			√	

APPENDIX B – CONSULTATION TEMPLATE

1.	Procedural Document's Name:	Empirical Antibiotic Guidelines for the Management of Common Infections in Adult Inpatients, V8.3.
2.	Procedural Document Author:	Dr Sahathevan, Dr Twagira, Helen McGowan, Julie Hawkes-Reekie
3.	Group/Committee Consulted:	Dr Gupta, Dr Mendall, Dr Soper, Miss Vig, Miss Hamid, Dr Siva, Dr Lim, Dr Savine, Dr Prentice, Dr Newman-Sanders, Dr Phillips, ASG, MMC.
4.	Date of Consultation:	As below, including MMC.
5.	Comments Received:	

Dr Phillips 10/12/10;
Epididymo-orchitis - Suggested Doxycycline 100mg BD for 10-14 days and different dose of Ofloxacin (400mg OD for 10-14 days)
PID – Suggested addition of Probenecid stat dose and duration of antibioitics – 5 days Metronidazole and 14 days Doxycycline.
Suggestion of Azithromycin as a choice in pregnancy.
24/12/10 - Dr Soper;
Length of pyelonephritis treatment could be shorter for mild cases. Suggest minimum of 5-7 days.
Conversely should have scope for a longer treatment for urosepsis. Suggest set a minimum as a guideline and use clinical judgement.
Suggest take out estimate Cr ranges for TDM and review use of Cockcroft and Gault equations.
Relying on culture results for step down could leave treatment blind for a large number of patients.
Dec 10 - Dr Lim; Satisfied with guidance
10/1/11 – Miss Vigg; Comments on the wording of initial assessment and review of diabetic foot. Start all patients as suspected to have MRSA. Agrees with antibiotic choices for this table and osteomyelitis table.
28/1/11 – Dr Siva; Discussion with Dr Sahathaven - agreed heading of LRTI for infections with no chest x-ray changes with signs of consolidation. Suggested criteria for starting Tazocin in patient with severe exacerbation of COPD. Suggested putting 'suspected atypical pneumonia' instead of atypical pneumonia.
31/1/11 – Dr Gupta – Noted Meropenem coming off tx of gastrointestinal diseases as 2nd line
3/2 – Dr Gupta and Dr Mendall – Would like to use Meropenem for 2nd line perforation related to previous surgical procedure or ERCP for biliary strictures or non response to tazocin.
Feb 2011 - Miss Hamid – Happy with PID guidelines.
Dr Savine, Dr Prentice, Dr Newman-Saunders – No comment.
MMC (Chair's Action, Nov 2011) – no amendments necessary.

MMC 9/10/12 (for minor amendment)

Louise Coughlan (Chief Pharmacist) Suggestion of statement at the beginning relating to Tazocin – that the generic Piperacillin-Tazobactam can be used for administration.
Dr Loke Suggestion that the policy should exclude children.

MMC 14/5/13 (for minor amendments – updated national guidance included)

D. Karagounis – Gent under penicillin allergy needs updating. Dr Fenton – some grammatical adjustments.

Dr Osuji – Will Gentamicin calculations be done in practice?

Jan 2014 – C.difficile treatment guidelines updated following publication of updated HPA national guidelines. Gentamicin dosing and monitoring section updated to reduce prescribing errors and risks of toxicity.
Dr Soper comments - suggested use of eGFR rather than CrCl to calculate renal function for gentamicin dosing.
Minor formatting amendments suggested by the Antimicrobial Steering Group (ASG).
Feb 2015 – Addition of Appendix H. Dr Fenton suggest to use BNF dose 12mg/kg instead. Incorporated.
MMC 7/12/15 – Dr Rajak – Needs to be taken to Consultants meeting & sent to Clinical Directors. Need some comment from them especially round intra-abdominal sepsis. (Previously circulated on e-mail with no response.) Dr Rajak to do.
Dr Gupta: Need to make it clear that Gentamicin is not for 2 week duration for intra-abdominal sepsis. Mr Abulafi – for short duration should be ok. Need to be clear what to do with patients who have poor renal function. Dr Mendall – need to use for short duration, ? Tazocin is a better choice.
Endocarditis – is there a definition for indolent (onset to presentation, etc.) To look.
HAP classification – is there something that we can use to guide clinicians on severity? Dr Rajak discuss with respiratory colleagues.
L. Coughlan – Use updated equality impact statement. M. Huntley – equality impact statement says not applicable to pregnant women but pregnant women referred to in UTI section. Needs review. P26 Amikacin – statement referring to Gentamicin needs updating. Can Gentamicin exclusion criteria be at the top of the document. DDW defined as dose determining weight. Jackie Green – statement around when to take levels for Vancomycin & Amikacin TDM needs to be more prominent, eg. under step 4.
Discussion around making TDM guidelines more visible. PDF Gentamicin - ? can we hyperlink on Cerner. To check with Devesh Patel.
To have a Gentamicin / TDM action card for nursing staff.
N. Cooley – for Gentamicin, to remove the >80 years as an exclusion criteria. To booklink pages in the guidelines. To increase the Ciprofloxacin dose to IV 400mg TDS for necrotising fasciitis & liver abcess. To remove Clarithromycin for moderate severity HAP.
May 2016 - HAP: Microbiologists updated HAP treatment guidelines further – antibiotic choices – circulated around ASG group & respiratory physicians. Classification further investigated for details – details incorporated from University Nottingham guidelines.

	MMC 5/9/16: Update to cellulitis 1st line treatment. Moving to Flucloxacillin monotherapy. Nil comments to change. **Circulated out among ASG & area leads 28/4/17 for comment:** Received from Dr Wood: ? regarding Co-amoxiclav 1st line for CAP for ITU patients, ? for Ceftriaxone for hospital acquired shock **MMC 8/5/17:** Update Cefuroxime dose under intra-abdominal sepsis for patients with CrCl <20ml/min. To put in the renal dose - updated. **March 2019 – circulated to ASG and area leads for comment.** Dr Gupta – decompensated alcoholic liver disease and management ?if we could give empirical abx to all patientss presenting with this. ASG – Urinary tract – include note use meropenem first line if previous ESBL isolated, remove pregnancy and refer to separate guideline for simple UTI. Bone and Joint – discussion over removal of second agent, British society of rheumatology and antibiogram support monotherapy. Skin and soft tissue – Discussion on suitable agent in penicillin allergy. Antibiogram supports doxycycline use. GI tract – removal of triple therapy due to high number of cases that do not receive suitable Gram negative cover due to early cessastion of gentamicin. Co-amox chosen to reduce broad spectrum use. For ongoing review and review of c.difficile cases. SBP – Change first line from ceftriaxone to piptaz. PUO – old regime have very little Gram negative cover due to early cessation of gent. Census to change to ceftriaxone. Resp – Discussion around firt line beta lactam. Changed to amoxicillin/co-amox due to high rates of escalation of benpen to broad spec at present (30%). Significant savings with reduced benpen use. Clari changed to doxy – reduced interactions and very good h.influenzae cover as well as atypical. (local antibiogram). Beta lactam free option changed to levofloxacin . Endocarditis – native valve gentamicin changed to OD for better monitoring. Prosthetic remains as BD. Some concerns over increase co-amoxiclav and cephlasporin use. Dr Sahathevan: add fidaxomicin to c.difficile treatment with discussion with microbiologist. Diabetic foot MS suggested piptaz/mero. Comment on urinary indications meropenem if hx of ESBL. Septic arthritis +benpen and clinda for systemically unwell Comment on ringing lab for urgent samples. Nec fas. Cipro changed to taz Perianal abcess amox + metro changed to mono co-amox Abdominal – add comment re previous ESBL . MMC Ensure oranges same colour. Add full name of guidelines referring to on trust intranet Spelling checks Allergy table alignment. **ASG August 2020** – Circulated to ASG members for comments. None received.
6.	Highlight where policy changed following consultation or state reasoning why comments not incorporated: Comments from Dr Phillips incorporated. Cr ranges taken out of TDM. Discussion of use of Cockcroft-Gault equation with senior pharmacists & enquiry of use of eGFR at other trusts for setting doses for TDM drugs. It was felt that although MDRD equation may be more appropriate for staging kidney disease, drug dosing is currently based on CrCl, particularly for narrow therapeutic drugs. Discussion of Dr Soper's other comments with Dr Sahathevan – referencing available for pyelonephritis suggests 14 days of treatment. Feels that with regard to duration that should be updated when diagnosis becomes clear and treatment should be reviewed based on culture results. 3/2; Gastroenterology - Meropenem included as requested. **MMC 9/10/12** Changes incorporated. **MMC 14/5/13** Updated Gentamicin and most of grammatical adjustments. Acknowledged that Gentamicin prescribing is a focus for training. **Jan 2014 -** Gentamicin dosing in literature is based on CrCl and this is a more accurate way of dosing drugs with narrow therapeutic windows. All other Trust's in the region use CrCl for gentamicin dosing. ASG suggestions included. **Dec 2015** Intra-abdominal sepsis – statement included to say that Gentamicin to be given for 72 hours only, then convert to PO. Statement to say if CrCl less than 20ml/min use Tazocin + Metronidazole. Dr Sahathevan re-sent document for comment on intra-abdominal sepsis – received – Dr Rajak satisfied with response. Indolent – National guidance gives a number of potential diagnostic criteria for endocarditis but doesn't quantify indolent other than a subacute / chronic, may have non-specific symptoms. HAP classification – JAC 2008 guidance on clinical diagnostic criteria – diagnosis of HAP often cannot be made on clinical criteria alone. Some markers given that may aid diagnosis. Equality impact assessment updated. P26 – Amikacin statement updated. Gentamicin – Exclusion criteria brought to the top. Patients >80 years in exclusion criteria removed. Vancomycin & Amikacin when to take levels – bolded. Gentamicin – how it links to CRS – discussed with Devesh Patel – to have a link to antibiotic intranet page.

	Gentamicin action card guidance for nursing staff drafted and circulated before submission to MMC. Ciprofloxacin dose increased to IV 400mg TDS for necrotising fasciitis & liver abcess. Clarithromycin removed for moderate severity HAP. **Micro discussion pre-MMC May 2017:** In response to Dr Wood comments: Co-amoxiclav is current BTS guidelines. This is sufficient for the expected pathogens, regardless of if patient requires ITU bed. Would not be suitable for HAP. Distinction made between hospital acquired shock on the general wards and ITU. VAP choice updated to Tazocin. **March 2019 -** Discussion with Dr Gupta agreed section to highlight high risk of infection in Decompensated ALD and to treat early if suspected with early review and cessation of treatment if infection ruled out. All comments from ASG agreed within ASG and updated. In response to increased cephlasporin and co-amox use, current guidelines often result in gentamicin being sole Gram negative agent which is often stopped early. Agreed to new guidance with continual audit review of c.diff rates. New guidelines recommend generally shorter course length in line with new evidence which will reduce c.diff risk. MS: add fidaxomicin to c.difficile treatment with discussion with microbiologist. IQ, MT, KH with review of antibiogram, piptaz/mero unsuitably broad for diabetic foot. Remain on co-amox. IQ, MT, KH – everyone will end up on triple therapy even if not true septic arthritis not systemically unwell. Need for benpen low if high dose fluclox used. Not incorporated.

APPENDIX C – GUIDELINES FOR THE PRESCRIBING AND ADMINISTRATION OF INTRAVENOUS IMMUNOGLOBULIN FOR THE TREATMENT OF CLOSTRIDIUM DIFFICILE INFECTION

Introduction

Recent guidelines from the Department of Health have advocated the use of intravenous immunoglobulin (IVIg) for patients with severe *Clostridium difficile* infection (CDI) unresponsive to other therapies[1].

IVIg may be used at Croydon University Hospital for patients with severe, refractory CDI:

- Following discussion with, or on the recommendation of, the Clostridium difficile Management Team
- Following submission of an IVIg request form and approval by the trust's Immunoglobulin Panel. Request forms and the procedure for obtaining approval can be found on the intranet (see IVIg request form).

Guidelines for Prescribers

The dose of IVIg for severe, refractory CDI is: **0.4grams/kg (one-off dose)**

The dose should be **rounded down** to the nearest 5g.

IVIg must be prescribed on the designated administration chart (see the Trust IVIG policy). Each vial should be prescribed on a separate line to enable accurate recording of batch numbers.

IVIg has been associated with acute renal failure and hypersensitivity and anaphylactic reactions. See 'Adverse Effects' below for guidance.

Guidelines for Administration

Please refer to the Trust IVIG policy.

Adverse Effects

Adverse effect	Recommendations
Hypersensitivity reactions and anaphylactic shock	• Follow the infusion rates on the administration chart; start the infusion slowly and increase gradually. • Monitor the patient for signs/symptoms (see below) throughout the infusion and for an hour after. • Depending on the severity of the reaction, either reduce the rate or stop the infusion. • In the case of anaphylaxis, standard management applies.
Acute renal failure	• Ensure adequate hydration before initiating the infusion. • Patients at risk should receive the minimum concentration and infusion rate practicable. • Monitor urine output throughout the infusion. • Monitor baseline and post-infusion serum creatinine. • Consider withholding loop diuretics. • In case of renal impairment, discontinue IVIg.
Transmission of infective agents (IVIg is a human blood product)	• The name and batch number of the product MUST be recorded on the administration chart.

Signs and symptoms of IVIg hypersensitivity:

Hypothermia	Fever
Headache	Vomiting
Allergic reactions, including rash, urticaria, nausea, arthralgia, hypotension and low back pain	
Anaphylactic shock	

Risk factors for hypersensitivity:

- Patients naïve to IVIg
- Patients switched from an alternative IVIg product
- When there has been a long interval since the previous infusion

Contraindications

- Selective IgA deficiency who have developed antibodies to IgA,
- Known hypersensitivity to any of the product components