Empirical Antibiotic Guidelines For Secondary Care

- See the DGRI Handbook and the DGRI Empirical Antibiotic Guidelines for further information
- The doses recommended below are based on normal renal/hepatic function
- See the BNF and Renal Drug Handbook for dose adjustments in renal/hepatic impairment
- Follow the antibiotic guidelines and discuss with Microbiology/ID if unsure
- Take blood cultures (and other microbiology samples) **BEFORE** giving antibiotics
- Document the indication and proposed duration of therapy to avoid unnecessarily prolonged prescription
- Confirm the nature of a drug allergy with the patient/GP as it is often not a true allergy
- Review **DAILY** the clinical response, microbiology results and prescription – can you **SIMPLIFY**, **SWITCH** or **STOP** the antibiotic?

See the DGRI Empirical Antibiotic Guidelines for the treatment of the following infections:

- Chickenpox and shingles
- Full ENT infections
- Genital tract infections
- Infective and traveller's diarrhoea
- Ophthalmology infections
- Infections in pregnancy

Sepsis 6

Sepsis 6 (within 1 hour)
1. Take blood cultures (and any other relevant samples)
2. Give IV antibiotics
3. Give O_2 to maintain target saturations
4. Measure lactate
5. Give IV fluids
6. Monitor hourly urine output

Scoring systems

SIRS score
- HR >90 beats/min
- RR >20 breaths/min
- temperature >38°C **OR** <36°C
- WCC >12×10⁹/L **OR** <4×10⁹/L

CURB65 score
- new onset confusion
- urea >7mmol/L
- RR ≥30 breaths/min
- SBP ≤90mmHg **OR** DBP ≤60mmHg
- age ≥65 years

***Clostridioides difficile* severity markers**
- WCC >15×10⁹/L
- temperature >38.5°C
- creatine >1.5 × baseline
- severe colitis on CT/AXR
- suspicion of pseudomembranous colitis **OR** toxic megacolon **OR** ileus

- Please see the DGRI Sepsis Bundle for complete guidance on dealing with sepsis and septic shock

Sepsis and septic shock

Please see the DGRI Sepsis Bundle

Sepsis
- Life-threatening organ dysfunction due to a dysregulated host response to infection (qSOFA score ≥2)

Septic shock
- Sepsis **AND** persistent hypotension requiring vasopressors to maintain MAP ≥65mmHg **AND** lactate ≥2mmol/L (despite adequate fluid resuscitation)

NHS Dumfries & Galloway

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Adapted from NHS GGC Infection Management Guidelines poster

Respiratory tract infections

Unsure if LRTI or UTI

No sepsis
- PO Nitrofurantoin **AND** PO Amoxicillin

If penicillin allergic
- PO Co-trimoxazole

Sepsis
- IV Amoxicillin **AND** IV Gentamicin[1]

If penicillin allergic
- IV Co-trimoxazole +/- IV Gentamicin[1]

Duration: clarify diagnosis at 48 hours

Community acquired pneumonia (CAP)

Non-severe CAP (CURB65 score ≤2 and no sepsis)
- PO Amoxicillin

If penicillin allergic
- PO Doxycycline[3] **OR** PO Clarithromycin[4]

Severe CAP (CURB65 score ≥3 or any CURB65 score with sepsis)
- PO/IV Clarithromycin[4] **AND EITHER** IV Amoxicillin **OR** IV Co-amoxiclav

If penicillin allergic or Legionella suspected
- PO/IV Levofloxacin[5] 500mg 12hrly

Duration: 5 days or 10-14 days (*Legionella*)

Hospital acquired pneumonia (HAP)

Early onset HAP (≤4 days from admission)
- Treat as per CAP

Non-severe late onset HAP (≥5 days from admission)
- PO Doxycycline[3] **OR** PO Co-trimoxazole

Severe late onset HAP (≥5 days from admission)
- IV Co-trimoxazole **AND** IV Gentamicin[1]

Duration: 5 days

Infective exacerbation of COPD

- PO Doxycycline[3] **OR** PO Amoxicillin **OR** PO Clarithromycin[4]

Duration: 5 days

Aspiration pneumonia

- IV Amoxicillin **AND** IV Metronidazole

If penicillin allergic
- IV Clarithromycin[4] **AND** IV Metronidazole

Duration: 5 days

Tonsillitis

- No antibiotics required as usually viral

Tonsillitis without sepsis
- PO Phenoxymethylpenicillin 500mg 6hrly **OR** PO Phenoxymethylpenicillin 1g 12hrly

If penicillin allergic
- PO Clarithromycin[4]

Duration: 10 days (Phenoxymethylpenicillin) or 5 days (Clarithromycin)

Tonsillitis with sepsis
- IV Benzylpenicillin 2.4g 6hrly **AND** IV Clindamycin 600mg 6hrly

If penicillin allergic
- IV Vancomycin[2] **AND** IV Clindamycin 600mg 6hrly

Duration: 10 days (IVOST once stable)

Urinary tract infections

Lower UTI (males and non-pregnant females) (SEE BOX)

- PO Trimethoprim **OR** PO Nitrofurantoin

If renal impairment (eGFR <30)
- PO Ciprofloxacin[5] 500mg 12hrly

Duration: 3 days (females) or 7 days (males)

Upper UTI/pyelonephritis (males and non-pregnant females)

Upper UTI without sepsis
- PO Trimethoprim **OR** PO Ciprofloxacin[5] 500mg 12hrly

Upper UTI with sepsis or pyelonephritis
- IV Gentamicin[1]

If renal impairment (eGFR <20)
- PO Ciprofloxacin[5] 500mg 12hrly

Duration: 7 days

Catheter-associated UTI (CAUTI) (SEE BOX)

CAUTI without sepsis
- Treat as per CAUTI with sepsis
- Step down to PO Nitrofurantoin **OR** PO Trimethoprim after catheter change

Duration: 3 days (females) or 7 days (males)

CAUTI with sepsis
- IV Gentamicin[1]
- Change catheter after first dose

If renal impairment (eGFR <20)
- PO Ciprofloxacin[5] 500mg 12hrly
- Change catheter after first dose

Duration: 7 days

Acute prostatitis

- PO Trimethoprim **OR** PO Ciprofloxacin[5] 500mg 12hrly

Duration: 14-28 days minimum

Epididymo-orchitis

≥35 years old
- PO Ofloxacin[5] 400mg daily

<35 years old
- PO Doxycycline[3]

Duration: 14 days

Epiglottitis/Supraglottitis

- IV Ceftriaxone 2g daily

If penicillin allergic
- IV Clindamycin 900mg 8hrly **AND** IV Ciprofloxacin 400mg 12hrly

Duration: 7-10 days (IVOST once stable)

Gastrointestinal infections

Intra-abdominal infection

Initial treatment
- IV Amoxicillin **AND** IV Metronidazole **AND** IV Gentamicin[1]

If renal impairment (eGFR <20)
- IV Piperacillin/Tazobactam 4.5g 12hrly

If penicillin allergic
- IV Vancomycin[2] **AND** IV Metronidazole **AND** IV Gentamicin[1]

If penicillin allergic and renal impairment (eGFR <20)
- IV/PO Ciprofloxacin[5] 500mg 12hrly **AND** IV Metronidazole

Step down treatment
- PO Co-trimoxazole **AND** PO Metronidazole

Duration: 5-7 days (total PO and IV)

Spontaneous bacterial peritonitis (SBP)

Not receiving Co-trimoxazole prophylaxis
- IV/PO Co-trimoxazole

Receiving Co-trimoxazole prophylaxis
- IV Co-amoxiclav

If penicillin allergic
- PO/IV Ciprofloxacin[5] 500mg/400mg 12hrly **AND** IV Vancomycin[2]

Duration: 7 days

Clostridioides difficile infection

- Assess severity daily **(SEE BOX)**
- Stop/rationalise non-*Clostridial* antibiotics
- Stop antimotility agents and PPIs
- *See SAPG guidance*

First line treatment of CDI: oral Vancomycin 125mg 6 hourly
Duration: 10 days

Severe/Life threatening infection: See full guideline and discuss with infection specialist

Second line Treatment/Recurrent infection:
(Definition: patients who fail to improve after 7 days or worsen with oral vancomycin)
Discuss with an infection specialist.
Treatment will depend on severity and clinical setting
Either: Fidaxomicin or Higher Dose Vancomycin with or without intravenous Metronidazole

Acute gastroenteritis

- Does not usually require treatment
- Take stool cultures

Decompensated chronic liver disease with sepsis of unknown origin

- IV Piperacillin/Tazobactam 4.5g 8hrly

If penicillin allergic
- IV/PO Ciprofloxacin[5] 500mg 12hrly **AND** IV Vancomycin[2]

Duration: 7 days

Suspected COVID-19/viral pneumonia

- Antibiotics not routinely required
- If evidence of bacterial infection on CXR/purulent sputum then treat as per CAP
- Consider stopping antibiotics once viral pneumonia confirmed

Skin and soft tissue infections

Cellulitis

Mild/moderate cellulitis
- PO Flucloxacillin

If penicillin allergic
- PO Doxycycline[3]

Duration: 5-7 days

Severe cellulitis
- IV Flucloxacillin 2g 6hrly
- Add IV Clindamycin 600mg 6hrly if rapidly progressing

If penicillin allergic or MRSA suspected
- IV Vancomycin[2]
- Add IV Clindamycin 600mg 6hrly if rapidly progressing

Duration: 7-10 days

Necrotising fasciitis

- Urgent surgical review
- Rationalise antibiotics following surgical review

- IV Piperacillin/Tazobactam 4.5g 6hrly **AND** IV Metronidazole **AND** IV Clindamycin 1.2g 6hrly **AND** IV Gentamicin[1]

If penicillin allergic or MRSA suspected
- IV Vancomycin[2] **AND** IV Metronidazole **AND** IV Clindamycin 1.2g 6hrly **AND** IV Gentamicin[1]

Duration: 10 days

Surgical wounds

- IV Flucloxacillin 1-2g 6hrly
- Add PO/IV Metronidazole **AND** IV Gentamicin[1] if contaminated

If penicillin allergic or MRSA suspected
- Discuss with Microbiology/ID

Duration: 7 days

Animal bites

- Assess tetanus and rabies risk

Non-severe bites
- PO Co-amoxiclav

If penicillin allergic
- PO Doxycycline[3] **AND** PO Metronidazole

Duration: 5 days

Severe bites
- IV Co-amoxiclav

If penicillin allergic
- IV Vancomycin[2] **AND** PO Metronidazole **AND** PO Ciprofloxacin[5] 500mg 12hrly

Duration: 7 days

Human bites

- Assess HIV and hepatitis risk
- Treat as per animal bites

Bone and joint infections

Septic arthritis

- Ensure joint aspiration prior to antibiotics

Native joint
- IV Flucloxacillin 2g 6hrly
- Add IV Gentamicin[1] if Gram-negative sepsis suspected

If penicillin allergic or MRSA suspected
- IV Vancomycin[2] **AND** IV Gentamicin[1]

Prosthetic joint
- Discuss with Microbiology/ID

Duration: 6 weeks (2 weeks IV followed by 4 weeks PO)

Osteomyelitis

- Discuss with Microbiology/ID

Mild diabetic foot ulcer

- PO Flucloxacillin

If penicillin allergic
- PO Doxycycline[3]

Duration: 5-7 days

Moderate diabetic foot ulcer

No previous antibiotics
- PO/IV Co-amoxiclav

If penicillin allergic
- PO Clindamycin 300-450mg 6hrly **OR** IV Clindamycin 900mg 8hrly

Previous antibiotics
- PO/IV Co-amoxiclav

If penicillin allergic
- IV Ciprofloxacin[5] 400mg 12hrly **AND** IV Metronidazole
- Add IV Vancomycin[2] if MRSA positive

Duration: 5-7 days

Severe diabetic foot ulcer

- Urgent surgical review

- IV Flucloxacillin 2g 6hrly **AND** IV Metronidazole
- Add IV Gentamicin[1] if sepsis suspected

If penicillin allergic or MRSA suspected
- IV Vancomycin[2] **AND** IV Metronidazole
- Add IV Gentamicin[1] if sepsis suspected

Duration: 10-14 days

Central nervous system infections

Lumbar puncture

Contraindications
- Raised ICP (focal neurological signs, papilloedema, continuous/uncontrolled seizures, GCS ≤12)
- Respiratory/cardiac compromise
- Signs of septic shock or rapidly evolving rash
- Infection at LP site
- Coagulopathy (see DGRI Handbook)

Bacterial meningitis

- IV Ceftriaxone 2g 12hrly **AND** IV Dexamethasone 10mg 6hrly
- Add IV Amoxicillin 2g 4hrly if *Listeria* suspected or immunocompromised
- Discuss with Microbiology/ID for further treatment

If penicillin anaphylaxis
- IV Chloramphenicol 25mg/kg 6hrly
- Add IV Co-trimoxazole 30mg/kg 6hrly if *Listeria* suspected or immunocompromised

If penicillin allergic **(SEE BOX)**
- Discuss with Microbiology/ID before prescribing

Duration: 7-14 days (depends on organism)

Viral meningitis

- Does not usually require treatment

Encephalitis

- IV Aciclovir 10mg/kg 8hrly
- Discuss with Microbiology/ID if HSV encephalitis suspected

Duration: 10-21 days

Systemic infections

Sepsis of unknown origin

- IV Amoxicillin **AND** IV Gentamicin[1]
- Add IV Clindamycin 600mg 6hrly if Group A *Streptococcus* suspected

If penicillin allergic or MRSA suspected
- IV Vancomycin[2] **AND** IV Gentamicin[1]
- Add IV Clindamycin 600mg 6hrly if Group A *Streptococcus* suspected

Duration: depends on source

Staphylococcus aureus bacteraemia (SAB)

- IV Flucloxacillin 2g 6hrly

If penicillin allergic or MRSA suspected
- IV Vancomycin[2]
- See SAPG SAB Guidance for investigation and management

Duration: 14 days minimum

Infective endocarditis

- Discuss with Microbiology/ID as diagnosis is difficult
- Aim for 3 sets of blood cultures prior to antibiotics (time according to patient condition, spread over 48 hours if stable)

Peripheral line infection

- Remove line (usually sufficient)
- Add IV Flucloxacillin 2g 6hrly if sepsis suspected

If penicillin allergic or MRSA suspected
- IV Vancomycin[2]

Duration: 5 days

Central line infection

- Discuss with Microbiology/ID

Neutropaenia

Immunocompromised patients

Neutropaenic sepsis
- Fever, sepsis or septic shock **AND** neutrophils <0.5×10⁹/L **OR** neutrophils <1×10⁹/L and recent chemotherapy (within 21 days)

Standard risk
- Neutropaenic sepsis **AND** signs of sepsis **AND** NEWS ≤6

High risk
- Neutropaenic sepsis **AND** signs of septic shock **OR** NEWS ≥7 **OR** acute leukaemia **OR** allogeneic stem cell transplant

Neutropaenic sepsis

Standard risk
- IV Piperacillin/Tazobactam 4.5g 6hrly
- Add IV Vancomycin[2] if MRSA positive

If penicillin allergic
- IV Vancomycin[2] **AND** IV Gentamicin[1]

High risk
- IV Piperacillin/Tazobactam 4.5g 6hrly **AND** IV Gentamicin[1]
- Add IV Vancomycin[2] if MRSA positive
- Discuss with Microbiology/ID

If penicillin allergic
- IV Vancomycin[2] **AND** IV Gentamicin[1] **AND** IV Ciprofloxacin[5] 400mg 8hrly
- Discuss with Microbiology/ID

Duration: 7 days (**IVOST** once apyrexial or cultures are known)

Penicillin allergy

- Penicillin allergy is documented in >10% of patients but the nature of allergy is often uncertain (not a true allergy)
- True allergy (anaphylaxis) occurs in <1% of patients and is a barrier to all beta-lactam antibiotics
- History of a rash or mild symptoms could still allow the use of cephalosporins or carbapenem antibiotics

Important tips for UTIs (see SIGN 160)

- Only use a dipstick in females <65 years
- Never dipstick a catheter specimen
- UTI diagnosis in females <65 years requires ≥2 urinary symptoms **AND** positive nitrites on dipstick
- Do not treat asymptomatic bacteriuria in non-pregnant females of any age

Take appropriate cultures prior to antibiotic therapy. Check previous microbiology results, allergies and drug interactions.

Urgent blood cultures and IV antimicrobial therapy within 1 hour. Check previous microbiology results.

Antibiotic doses (unless otherwise stated)

Antibiotic	PO dose*	IV dose*
Amoxicillin	1g 8hrly	1g 8hrly
Clarithromycin	500mg 12hrly	500mg 12hrly
Co-amoxiclav	625mg 8hrly	1.2g 8hrly
Co-trimoxazole	960mg 12hrly	960mg 12hrly
Doxycycline	200mg stat then 100mg 12hrly	No IV option
Flucloxacillin	1g 6hrly	2g 6hrly
Metronidazole	400mg 8hrly	500mg 8hrly
Nitrofurantoin	50mg 6hrly (or 100mg MR 12hrly)	No IV option
Trimethoprim	200mg 12hrly	No IV option

*All doses assume normal renal/hepatic function (see the BNF and Renal Drug Handbook for dose adjustments)

Gentamicin[1] and Vancomycin[2]

- Should be prescribed using the online dosage calculators (available on the DGRI Handbook)
- Require monitoring (see the paper prescription charts)
- Check renal function daily
- Record accurate times of administration and concentration measurements on the paper charts

Gentamicin[1]
- Take a level 6-14 hours after each dose
- Stop treatment and contact Microbiology/ID if the patient reports symptoms of ototoxicity
- Do not use for more than 3-4 days unless advised by Microbiology/ID
- Avoid in patients with decompensated liver disease and MG

Vancomycin[2]
- If creatinine is not available, give the loading dose according to actual body weight
- Take a trough level within 48 hours of starting treatment

Important drug interactions and side effects

Myasthenia gravis: Please see Handbook page before prescribing antibiotics

Doxycycline[3]
- Reduced absorption with iron, calcium, magnesium and some nutritional supplements

Macrolides (Clarithromycin[4])
- High risk for serious drug interactions (see the BNF or seek pharmacy advice)
- Avoid in patients with a prolonged QTc interval

Quinolones (Ciprofloxacin[5], Levofloxacin[5] and Ofloxacin[5]) - Patient information leaflet required on prescription
- Reduced absorption with iron, calcium, magnesium and some nutritional supplements
- High risk for serious drug interactions (see the BNF or seek pharmacy advice)
- Stop treatment at the first sign of side effects (tendonitis)
- Use with caution in patients >60 years old
- Avoid in patients with a prolonged QTc interval
- Avoid prescribing in combination with corticosteroids