

Empirical First Line Antibiotic Therapy for Adult Patients

Guidance available via NHS Lanarkshire Guidelines App

STOP AND THINK BEFORE YOU GIVE ANTIBIOTICS

- 1 IN 5 ANTIBIOTIC COURSES ARE ASSOCIATED WITH ADVERSE EVENTS INCLUDING C. DIFFICILE, DRUG INTERACTIONS / TOXICITY, DEVICE RELATED INFECTIONS AND S. AUREUS BACTERAEMIA

REVIEW IV ANTIBIOTICS DAILY

1. DOCUMENT INDICATION CLEARLY IN NOTES AND ON HEPMA AT TIME OF PRESCRIBING
2. DOCUMENT CLEAR EVIDENCE OF REVIEW IN NOTES WITHIN 72 HOURS

SWITCH - Switch IV to oral when sepsis is resolving. Consult IVOST policy

SIMPLIFY - Review antibiotics and change to narrow spectrum once microbiology results are available

STOP - Observe indicated duration of therapy. Ensure stop date added to oral therapy on HEPMA



CURB65: Score 1 for each of:

- Confusion new (AMT \leq 8/10)
- Urea $>$ 7 mmol/L
- RR \geq 30/min
- BP SBP $<$ 90mmHg or DBP \leq 60mmHg
- Age \geq 65

Additional Adverse Prognostic Features:

- SpO₂ $<$ 92% or PaO₂ $<$ 8kPa on any FIO₂
- Multi-lobar change on CXR

CURB 65 score may overestimate CAP severity in the elderly therefore correlate with sepsis criteria.

Clostridioides difficile infection associated with prescribing of: Cephalosporins, Co-amoxiclav, Clindamycin, and Quinolones (Ciprofloxacin, Levofloxacin)

IV THERAPY WITHIN ONE HOUR IS REQUIRED FOR SEPSIS OR OTHER SEVERE INFECTIONS

SEPSIS: (includes Systemic Inflammatory Response Syndrome (SIRS*)) Infection WITH evidence of ORGAN HYPOPERFUSION \geq 2 of: **Confusion** GCS $<$ 15, **Resp rate** \geq 22/min, **Systolic BP** \leq 100mm Hg. *SIRS indicated by Temp $<$ 36°C or $>$ 38°C, HR $>$ 90 bpm, RR $>$ 20/min & WCC $<$ 4 or $>$ 12 \times 10⁹/L. SIRS is not specific to bacterial infection (also viral and non-infective causes).

NEUTROPENIC SEPSIS: Neutropenic ($<$ 0.5 \times 10⁹ neutrophils/L) **PLUS EITHER** **Pyrexial** (temperature $>$ 38°C) **OR** **Apyrexial & Clinically unwell** (symptoms may include fever, sweats, chills, rigors, malaise, respiratory rate $>$ 20/min, HR $>$ 90 bpm).

ENSURE Sepsis 6 within ONE HOUR: 1. Blood cultures (& any other relevant samples). 2. IV antibiotic administration. 3. Oxygen to maintain target saturation. 4. Measure Lactate. 5. IV fluids. 6. Monitor urine output hourly.

Appropriate microbiological sampling prior to antibiotics is essential.

Obtain blood cultures (8 - 10ml / bottle) & other appropriate samples e.g. urine, sputum, CSF, wound swab.

Lower Respiratory Tract Infections

Community Acquired Pneumonia (CAP)
SEVERE CURB65⁶ 3-5 Or SEPSIS

IV Amoxicillin 1g 8 hrly

If treated previously or adverse prognostic features
IV Co-amoxiclav¹⁰ 1.2g 8hrly

Penicillin allergy
Oral Levofloxacin^{1,2,8,9,10,12} 500mg 12 hrly
Total duration (IV/oral) 5 days

NON-SEVERE CURB65⁶ \leq 2
Oral Amoxicillin 500mg -1g 8 hrly

Penicillin allergy or alternative required
Oral Doxycycline^{2,9} 200mg stat then 100mg daily
Total duration 5 days

Hospital Acquired Pneumonia (HAP)
(Occurring $>$ 48hrs post-admission or within 10 days of discharge)
SEVERE

IV Co-amoxiclav¹⁰ 1.2g 8 hrly
IV +/- Gentamicin³

Penicillin allergy
Oral Levofloxacin^{1,2,8,9,10,12} 500mg 12 hrly
OR
Oral / IV Co-trimoxazole^{2,10,12,13} 960mg 12 hrly

NON-SEVERE
Oral Doxycycline^{2,9} 100mg 12 hrly
OR
Oral Co-trimoxazole^{2,10,12,13} 960mg 12 hrly
Total duration (IV/oral) 5 days

Atypical Pneumonia
ONLY if suspected Atypical Pneumonia
ADD
Oral Clarithromycin¹ 500mg 12 hrly
(If pregnant Oral Erythromycin¹ 500mg 6 hrly)
To Amoxicillin or Co-amoxiclav therapy
Doxycycline & Levofloxacin cover atypical pneumonia organisms

Risk factors Include:

- Returning travellers
- Bird or animal exposure

Aspiration Pneumonia
IV Amoxicillin 1g 8 hrly
+ IV Metronidazole 500mg 8 hrly
If severe ADD IV Gentamicin³

Penicillin allergy
IV Vancomycin³
+ IV Metronidazole 500mg 8 hrly
If severe ADD IV Gentamicin³
Total duration (IV/oral) 5 days

Confirmed Legionella Pneumonia
Oral Levofloxacin^{1,2,8,9,10,12} 500mg 12 hrly

Total duration (IV/oral) minimum 7 days; longer duration may be required in severe disease or immunocompromised

Staphylococcal Pneumonia suspected
Treat as per SEVERE CAP
+ IV Flucloxacillin⁵ 1g 6hrly

Penicillin allergy or MRSA suspected
Treat as per SEVERE CAP
+ IV Vancomycin³
Total duration (IV/oral) - seek advice from Infection Specialist, if appropriate, in working hours

Infective Exacerbation COPD
SEVERE exacerbation of COPD with pneumonia
Follow SEVERE CAP guidance.

MILD/MODERATE Infective exacerbation of COPD
Antibiotics only if purulent sputum (send for culture along with viral throat swab)

Oral Amoxicillin 500mg-1g 8 hrly

Penicillin allergy or alternative required
Oral Doxycycline^{2,9} 200mg stat then 100mg daily **OR**
Oral Clarithromycin¹ 500mg 12 hrly
Total duration 5 days

Suspected COVID-19 pneumonia ONLY
Antibiotics are rarely indicated as bacterial co-infection is uncommon in COVID-19 pneumonia.
Bacterial co-infection is suggested if purulent (green/brown) sputum.

Uncertain if LRTI/ UTI
Send MSSU, sputum & viral throat swab **DO NOT** prescribe Co-amoxiclav
Treat separately as per appropriate section of empiric policy
Review/clarify diagnosis at 48 hours

Urinary Tract Infections

Upper UTI (UUTI / Pyelonephritis)
IV Gentamicin³
+IV Amoxicillin 1g 8hrly

Penicillin allergy
IV Gentamicin³
+ IV Vancomycin³
Total duration (IV/oral) 7-10 days
Consult IVOST policy
Men Consider prostate involvement and urology referral

Lower UTI

- Do not treat asymptomatic bacteriuria in non-pregnant adults
- Send urine culture

Nitrofurantoin M/R 100mg 12 hrly
(Contraindicated if CrCl $<$ 30ml/min, caution in CrCl 30 – 44ml/min)⁷

OR
Trimethoprim^{10,11} 200mg 12 hrly
Total duration
Women 3 days, Men 7 days

Catheterised patients
Only treat if systemically unwell or pyelonephritis likely.

- Remove or replace catheter
- Send pre-treatment CSU
- Start empirical antibiotics

Start antibiotics as guided by recent CSU's or empirically as above if there are no positive cultures
Total duration 7 days

Doses may need to be adjusted in renal impairment
Always check BNF for interactions
Seek advice if patient pregnant

1. Check interactions in the BNF. Caution may prolong QT interval.
2. Avoid / Caution in pregnancy or breastfeeding. Consult BNF for details.
3. Gentamicin / Vancomycin refer to online calculators.
4. ALERT Antibiotic - Consult Second line Policy on NHS Lanarkshire Guideline App.
5. Monitor sodium.
6. See CURB65 definition above.
7. Reference: The Renal Drug Handbook 5th Edition, 2018. Online access.
8. See Fluoroquinolones MHRA guidance on NHS Lanarkshire Guidelines App.
9. Doxycycline and quinolones decreased absorption with iron, calcium, magnesium and some nutritional supplements. See BNF appendix 1 or pharmacy for advice.
10. Caution in renal impairment – see BNF or pharmacy for advice.
11. Use with caution may increase K+ and decrease renal function. Monitor.
12. High / Excellent oral bioavailability, IV route available for NBM or vomiting.
13. See Co-trimoxazole information for prescribers' safety sheet on NHS Lanarkshire Guidelines App.

Skin/Soft Tissue Infections

Moderate to severe Cellulitis/Erysipelas
IV Flucloxacillin^{5,10} 1-2g 6 hrly

Penicillin allergy or MRSA suspected
IV Vancomycin³

Total duration IV / oral 7-14 days depending on clinical progress
For upper limb cellulitis seek advice from Orthopaedics

Mild-moderate Cellulitis
Oral Flucloxacillin⁵ 500mg - 1g 6 hrly

Penicillin allergy
Oral Doxycycline^{2,9} 100mg 12 hrly
OR
Oral Co-trimoxazole^{2,10,12,13} 960mg 12 hrly
Total duration 5 days

Suspected Necrotising Fasciitis or severe or rapidly progressive infection in Person who injects drugs (PWID)

- Seek URGENT Surgical / Orthopaedic review. URGENT DEBRIDEMENT / EXPLORATION maybe required
- TAKE blood cultures & COMMENCE empirical antibiotics as per policy
- LIAISE with Infection Specialist.

IV Flucloxacillin^{5,10} 2g 6 hrly
+ IV Benzylpenicillin 2.4g 4 hrly
+ IV Gentamicin³
+ **Oral / IV Metronidazole¹² 400mg / 500mg 8 hrly**
+ IV Clindamycin 1.2g 6 hrly

True Penicillin allergy or MRSA suspected
+ IV Vancomycin³
+ IV Gentamicin³
+ **Oral / IV Metronidazole¹² 400mg / 500mg 8 hrly**
+ IV Clindamycin 1.2g 6 hrly

Total duration 10 days or as per Infection Specialist

Infected human/animal bite
Consider risk of BBV transmission
Consider Tetanus prophylaxis

SEVERE bite
Consider Surgical review
IV Co-amoxiclav¹⁰ 1.2g 8 hrly

True Penicillin allergy
IV Vancomycin³
+ Oral Metronidazole¹² 400mg 8 hrly
+ Oral Ciprofloxacin^{1,2,8,9,10,12} 500mg 12 hrly

Total duration (IV / oral) 7 days
NON-SEVERE bite
Oral Co-amoxiclav 625mg 8 hrly

True Penicillin allergy
Oral Doxycycline^{2,9} 100mg 12 hrly
+ Oral Metronidazole¹² 400mg 8 hrly
Total duration 5 days (treatment), 3 days (prophylaxis)

Post Septal/Orbital Cellulitis
This is an emergency. Seek immediate specialist advice from Ophthalmology & ENT. Consider CT imaging & drainage

IV Ceftriaxone 2g 24 hrly
(or 12 hrly if intracranial extension)
+ IV Flucloxacillin^{5,10} 1-2g 6 hrly
+ **Oral / IV Metronidazole¹² 400mg / 500mg 8 hrly**

Penicillin intolerance/minor Penicillin allergy (see below for severe penicillin allergy/anaphylaxis)
IV Ceftriaxone 2g 24 hrly
(or 12 hrly if intracranial extension)
+ **Oral / IV Metronidazole¹² 400mg / 500mg 8 hrly**

Clear history of anaphylaxis with Penicillin or severe/true Penicillin allergy
IV Vancomycin³
+ IV Ciprofloxacin^{1,2,8,9,10} 400mg 12 hrly
+ **Oral / IV Metronidazole¹² 400mg / 500mg 8 hrly**

Gastrointestinal Infections

Intra-abdominal/Hepatobiliary/ Pelvic Sepsis
IV Amoxicillin 1g 8 hrly
+ **Oral / IV Metronidazole¹² 400mg / 500mg 8 hrly**
+ IV Gentamicin³

Penicillin allergy
IV Vancomycin³
+ **Oral / IV Metronidazole¹² 400mg / 500mg 8 hrly**
+ IV Gentamicin³

Give all 3 recommended antibiotics otherwise the regimen may be ineffective
Total duration 7-10 days

Spontaneous Bacterial Peritonitis
If Peritoneal white cell count $>$ 500/mm³ ($>$ 0.5 \times 10⁹/L) or neutrophils $>$ 250/mm³ ($>$ 0.25 \times 10⁹/L)

OR
Decompensated Chronic Liver disease with Sepsis unknown source

IV Piperacillin / Tazobactam^{4,10} 4.5g 8 hrly

Penicillin allergy
Oral / IV Ciprofloxacin^{1,2,8,9,10,12} 500mg / 400mg 12 hrly
+ IV Vancomycin³

Total duration (IV/oral) 7 days

Gastroenteritis
Antibiotics not usually required

Clostridioides difficile infection

- Stop/simplify concomitant antibiotic(s)
- Review/ stop gastric acid suppression and antimotility agents
- Review NSAID/ACE/ARB/diuretic agents
- Clinical or radiological evidence of severe colitis.

Oral Vancomycin 125mg 6 hrly
Total duration 10 days

Recurrence / Relapse / Ineffective treatment
Refer to NICE/SAPG Guidance/ Consult local IPCT CDAD guidance.

Bone/Joint Infections

Acute Osteomyelitis including Discitis
Ensure blood cultures are taken promptly (minimum 2 sets) prior to starting treatment
IV Flucloxacillin^{5,10} 2g 6 hrly

Penicillin allergy
IV Vancomycin³

Total duration
Liaise with Neurosurgery/ Orthopaedics

Septic Arthritis-Native or Prosthetic Joint infection
Obtain blood cultures and ideally also obtain synovial fluid / deep tissue samples prior to antibiotic therapy.

Native Joint
IV Flucloxacillin^{5,10} 2g 6 hrly
+/- *** IV Gentamicin³

Penicillin allergy or MRSA suspected
IV Vancomycin³
+/- *** IV Gentamicin³

Prosthetic Joint
IV Vancomycin³
+/- *** IV Gentamicin³

Total duration
Liaise with Orthopaedics

***if high risk for Gram negative bacterial infection i.e. immunocompromised, recurrent UTI or sickle cell disease.

Diabetic Foot Infection
Notify Diabetologist at first opportunity. Send specimen for culture and review previous microbiology.

SEVERE infection
IV Flucloxacillin^{5,10} 2g 6 hrly
+ IV Clindamycin 600mg 6 hrly
+ IV Gentamicin³

Penicillin allergy or MRSA suspected
IV Vancomycin³
+ IV Clindamycin 600mg 6 hrly
+ IV Gentamicin³

MODERATE infection
IV Flucloxacillin^{5,10} 2g 6 hrly
+ IV Metronidazole¹² 500mg 8 hrly

Penicillin allergy
Oral / IV Co-trimoxazole^{2,10,12,13} 960mg 12 hrly
+ Oral Metronidazole 400mg 8 hrly

MILD infection
Oral Flucloxacillin⁵ 1g 6hrly

Penicillin allergy
Oral / IV Co-trimoxazole^{2,10,12,13} 960mg 12 hrly **OR**
Oral Clindamycin¹² 450mg 6hrly

Total duration - Liaise with Diabetologist

All indications - Total duration 4 – 6 weeks liaise with Infection Specialist and consider OPAT

CNS Infections

Possible Bacterial Meningitis
IV Ceftriaxone 2g 12hrly
+ IV Dexamethasone 10mg 6hrly for first 4 days

If listeria meningitis suspected
+ IV Amoxicillin¹⁰ 2g 4hrly
If penicillin resistant pneumococcus suspected
+ IV Vancomycin³

Penicillin intolerance/minor Penicillin allergy (see box below for severe penicillin allergy/anaphylaxis)
IV Ceftriaxone 2g 12hrly
+ IV Dexamethasone 10mg 6hrly for first 4 days

If listeria meningitis suspected
+ IV Co-trimoxazole^{2,10,12,13} 120mg/kg/day
(split into 2-4 divided doses).
(Adjust regimen dose/ frequency to allow simplest administration of 480mg/5ml vials)

If penicillin resistant pneumococcus suspected
+ IV Vancomycin³

Clear history of anaphylaxis with Penicillin or severe/true Penicillin allergy
IV Chloramphenicol 25mg/kg (max 2g) 6 hrly
ONLY on advice of treating Consultant
+ IV Dexamethasone 10mg 6 hrly for first 4 days

If listeria meningitis suspected
+ IV Co-trimoxazole^{2,10,12,13} 120mg/kg/day
(split into 2-4 divided doses).
(Adjust regimen dose/ frequency to allow simplest administration of 480mg/5ml vials)

Listeria Meningitis
may be suspected if over 60yrs, immunocompromised (including diabetic, alcohol excess, liver disease, pregnancy)

Total duration (if clinically recovered)

- Meningococcal – 5 days
- Pneumococcal – 10 days
- Listeria – 21 days
- No pathogen - 10 days

Possible Encephalitis
+ IV Aciclovir¹⁰ 10mg/kg 8 hrly
Use adjusted body weight if BMI \geq 30.
AdjBW = IBW + 0.4 (actual body weight – IBW)

Total duration 10-14 days

In pregnancy - Consultant responsible for patient to discuss with Infection Specialist if required.

- Amoxicillin not known to be harmful
- Ceftriaxone & Vancomycin - Manufacturer advises use only if benefit outweighs risk
- Chloramphenicol advised to avoid.
- Co-trimoxazole – teratogenic risk in 1st trimester & neonatal haemolysis & methaemoglobinemia in 3rd trimester.

Neutropenic Sepsis or Immunocompromised

If Haematology/Oncology patient discuss with appropriate specialist
NB Check previous microbiology results and TrakCare ALERTS for evidence of multidrug resistant organisms and seek advice from infection specialist.

IV Piperacillin/Tazobactam^{4,10} 4.5g 6 hrly
+ IV Gentamicin³

Consider for indwelling line
ADD IV Vancomycin³
Consider fungal infection

Penicillin intolerance/minor Penicillin allergy (see box below for severe penicillin allergy/anaphylaxis)
IV Vancomycin³
+ IV Aztreonam¹⁰ 2g 6 hrly
+ IV Gentamicin³
Consider fungal infection

Clear history of anaphylaxis with Penicillin or severe/true Penicillin allergy
IV Vancomycin³
+ IV Ciprofloxacin^{1,2,8,9,10,12} 400mg 12hrly
(high oral bioavailability - consider switch at 24 hours)
+ IV Gentamicin³
Consider fungal infection

Possible Infective Endocarditis

Always take blood cultures prior to starting antibiotic treatment.
Obtain three sets over 24 hours, minimum 30 mins apart, with 10ml in each bottle.
Seek senior specialist advice.

Native heart valve
IV Amoxicillin¹⁰ 2g 4hrly
+ IV Gentamicin (synergistic dosing).
ADD
IV Flucloxacillin^{5,10} 2 g 6 hrly $<$ 85kg (4 hrly $>$ 85 kg)
if high suspicion of S. aureus endocarditis or PWID.

Penicillin allergy, or MRSA known or suspected
IV Vancomycin³
+ IV Gentamicin (synergistic dosing).

Prosthetic heart valve
IV Vancomycin³
+ IV Gentamicin (synergistic dosing)
+ Oral / IV Rifampicin 300mg - 600mg 12hrly

Severe Systemic Infection Source Unknown

IV Amoxicillin 1g 8 hrly
+ **Oral / IV Metronidazole¹² 400mg / 500mg 8 hrly**
+ IV Gentamicin³

Penicillin Allergy or MRSA suspected
+ **Oral / IV Metronidazole¹² 400mg / 500mg 8 hrly**
+ IV Gentamicin³

Give all 3 recommended antibiotics otherwise the regimen may be ineffective