# 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

NHS Lanarkshire

**CURB65: Score 1** for each of:
- Confusion new (AMT ≤8/10)
- Urea > 7 mmol/L
- RR ≥ 30/min
- BP SBP<90mmHg or DBP ≤60mmHg
- Age ≥65

**Additional Adverse Prognostic Features:**
- $SpO_2$ <92% or $PaO_2$ <8kPa on any $FiO_2$
- 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 ≥ **2** of:
**Confusion** GCS < 15, **Resp rate** ≥ 22/min, **Systolic BP** ≤ 100mm Hg.
**SIRS indicated by Temp < 36°C or > 38°C, HR > 90 bpm, RR > 20/min & WCC < 4 or > 12 x $10^9$/L. SIRS is not specific to bacterial infection (also viral and non-infective causes).*

**NEUTROPENIC SEPSIS**: **Neutropenic** (<0.5 x $10^9$ 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 CURB65[6] 3-5 Or SEPSIS**
IV Amoxicillin 1g 8 hrly
If treated previously or adverse prognostic features
IV Co-amoxiclav[10] 1.2g 8hrly

**Penicillin allergy**
Oral Levofloxacin[1,2, 8,9,10,12] 500mg 12 hrly
**Total duration (IV/oral) 5 days**

**NON-SEVERE CURB65[6] ≤ 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**

**Atypical Pneumonia**
ONLY if suspected Atypical Pneumonia
**ADD**
Oral Clarithromycin[1] 500mg 12 hrly
(If pregnant Oral Erythromycin[1] 500mg 6 hrly)
**To Amoxicillin or Co-amoxiclav therapy**
*Doxycycline & Levofloxacin cover atypical pneumonia organisms*

**Risk factors Include:**
- Returning travellers
- Bird or animal exposure

### Hospital Acquired Pneumonia (HAP)

(Occurring > 48hrs post-admission or within 10 days of discharge)

**SEVERE**
IV Co-amoxiclav[10] 1.2g 8 hrly
IV +/- Gentamicin[3]

**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**

### Aspiration Pneumonia

IV Amoxicillin 1g 8 hrly
+ IV Metronidazole 500mg 8 hrly
If severe ADD IV Gentamicin[3]

**Penicillin allergy**
IV Vancomycin[3]
+ IV Metronidazole 500mg 8 hrly
If severe ADD IV Gentamicin[3]
**Total duration (IV/oral) 5 days**

### Staphylococcal Pneumonia suspected

**Treat as per SEVERE CAP**
+ IV Flucloxacillin[5] 1g 6hrly

**Penicillin allergy or MRSA suspected**
**Treat as per SEVERE CAP**
+ IV Vancomycin[3]
**Total duration (IV/oral) - seek advice from Infection Specialist, if appropriate, in working hours**

### 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

### 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 Clarithromycin[1] 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 Gentamicin[3]
+IV Amoxicillin 1g 8hrly

**Penicillin allergy**
IV Gentamicin[3]
+ IV Vancomycin[3]
**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**

## Skin/Soft Tissue Infections

### Moderate to severe Cellulitis/Erysipelas

IV Flucloxacillin[5,10] 1-2g 6 hrly

**Penicillin allergy or MRSA suspected**
IV Vancomycin[3]
**Total duration IV / oral 7-14 days depending on clinical progress**
*For upper limb cellulitis seek advice from Orthopaedics*

### Mild-moderate Cellulitis

Oral Flucloxacillin[5] 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 Gentamicin[3]
+ **Oral** / IV Metronidazole[12] **400mg** / 500mg 8 hrly
+ IV Clindamycin 1.2g 6 hrly

**True Penicillin allergy or MRSA suspected**
+ IV Vancomycin[3]
+ IV Gentamicin[3]
+ **Oral** / IV Metronidazole[12] **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-amoxiclav[10] 1.2g 8 hrly

**True Penicillin allergy**
IV Vancomycin[3]
+ Oral Metronidazole[12] 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 Metronidazole[12] 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 Metronidazole[12] **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 Metronidazole[12] **400mg** / 500mg 8 hrly

**Clear history of anaphylaxis with Penicillin or severe/true Penicillin allergy**
IV Vancomycin[3]
+ IV Ciprofloxacin[1,2,8,9,10] 400mg 12 hrly
+ **Oral** / IV Metronidazole[12] **400mg** / 500mg 8 hrly

### Pre Septal/Periorbital Cellulitis

Oral Flucloxacillin[5] 1g 6 hrly

**Penicillin allergy**
Oral Clindamycin[12] 450mg – 600mg 6 hrly (depending on the severity)

**Total duration**
**Mild - 5 days. Severe - 7 days**

## Gastrointestinal Infections

### Intra-abdominal/ Hepatobiliary/Pelvic Sepsis

IV Amoxicillin 1g 8 hrly
+ **Oral** / IV Metronidazole[12] **400mg** / 500mg 8 hrly
+ IV Gentamicin[3]

**Penicillin allergy**
IV Vancomycin[3]
+ **Oral** / IV Metronidazole[12] **400mg** / 500mg 8 hrly
+ IV Gentamicin[3]

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 x $10^9$/L) or neutrophils >250/ mm³ (> 0.25 x $10^9$/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 Vancomycin[3]
**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 Vancomycin[3]
**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 Gentamicin[3]

**Penicillin allergy or MRSA suspected**
IV Vancomycin[3]
+/- *** IV Gentamicin[3]

**Prosthetic Joint**
IV Vancomycin[3]
+/- *** IV Gentamicin[3]

**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 Gentamicin[3]

**Penicillin allergy or MRSA suspected**
IV Vancomycin[3]
+ IV Clindamycin 600mg 6 hrly
+ IV Gentamicin[3]

**MODERATE infection**
IV Flucloxacillin[5,10] 2g 6 hrly
+ IV Metronidazole[12] 500mg 8 hrly

**Penicillin allergy**
**Oral** / IV Co-trimoxazole[2,10,12,13] 960mg 12 hrly
+ Oral Metronidazole 400mg 8 hrly
**OR**
**Oral** / IV Clindamycin[12] 600mg 6 hrly

**MILD infection**
Oral Flucloxacillin[5] 1g 6hrly

**Penicillin allergy**
Oral Co-trimoxazole[2,10,12,13] 960mg 12 hrly **OR**
Oral Clindamycin[12] 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 Amoxicillin[10] 2g 4hrly
**If penicillin resistant pneumococcus suspected**
+ IV Vancomycin[3]

**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 Vancomycin[3]

**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 Aciclovir[10] 10mg/kg 8 hrly
(use ideal body weight if patient is obese (BMI ≥ 30)
**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 & methaemoglobinaemia 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 Gentamicin[3]
**Consider for indwelling line**
ADD IV Vancomycin[3]
Consider fungal infection

**Penicillin intolerance/minor**
**Penicillin allergy**
*(see box below for severe penicillin allergy/anaphylaxis)*
IV Vancomycin[3]
+ IV Aztreonam[10] 2g 6 hrly
+ IV Gentamicin[3]
Consider fungal infection

**Clear history of anaphylaxis with Penicillin or severe/true Penicillin allergy**
IV Vancomycin[3]
+ IV Ciprofloxacin[1,2,8,9,10,12] 400mg 12hrly
(high oral bioavailability - consider switch at 24 hours)
+ IV Gentamicin[3]
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 Amoxicillin[10] 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 Vancomycin[3]
+ IV Gentamicin (synergistic dosing).

**Prosthetic heart valve**
IV Vancomycin[3]
+ IV Gentamicin (synergistic dosing)
+ Oral / IV Rifampicin 300mg - 600mg 12hrly

## Severe Systemic Infection Source Unknown

IV Amoxicillin 1g 8 hrly
+ **Oral** / IV Metronidazole[12] **400mg** / 500mg 8 hrly
+ IV Gentamicin[3]
**Penicillin Allergy or MRSA suspected**
IV Vancomycin[3]
+ **Oral** / IV Metronidazole[12] **400mg** / 500mg 8 hrly
+ IV Gentamicin[3]
Give all 3 recommended antibiotics otherwise the regimen may be ineffective

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.

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