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

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

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

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 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 × 10^9/L) or neutrophils >250/ mm³ (> 0.25 × 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 adjusted body weight if BMI ≥ 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 & 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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