NHS
Greater Glasgow and Clyde

CLINICAL GUIDELINE

Hospital Infection Management Guidelines Empirical Antibiotic Therapy in Adults

A guideline is intended to assist healthcare professionals in the choice of disease-specific treatments.

Clinical judgement should be exercised on the applicability of any guideline, influenced by individual patient characteristics. Clinicians should be mindful of the potential for harmful polypharmacy and increased susceptibility to adverse drug reactions in patients with multiple morbidities or frailty.

If, after discussion with the patient or carer, there are good reasons for not following a guideline, it is good practice to record these and communicate them to others involved in the care of the patient.

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Important Note:

The online version of this document is the only version that is maintained.
Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

Hospital Infection Management Guidelines Empirical Antibiotic Therapy in Adults

NHS Greater Glasgow and Clyde

Key to good Antimicrobial Stewardship
BLOOD CULTURES = 40mls (10mls in each of 4 bottles), **RECORD** diagnosis and therapy duration on HEPMA **REVIEW IV therapy** DAILY and consider **IVOST or STOP**

NB Doses recommended based on normal renal / liver function - see BNF or Renal handbook for dosing advice. For info on antimicrobial contra-indications, cautions and monitoring see BNF.

Definition of SEPSIS: INFECTION (includes Systemic Inflammatory Response Syndrome (SIRS*)) **WITH evidence of ORGAN HYPOPERFUSION (≥ 2 of: Confusion, < 15 GCS or Resp Rate ≥ 22/ min or Systolic BP ≤ 100 mm Hg).**

Ensure SEPSIS 6 within one hour if NEWS ≥ 7: 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.

*SIRS indicated by Temp < 36°C or > 38°C, HR > 90 bpm, RR > 20/ min & WCC < 4 or > 12 x10⁹/ L. SIRS is not specific to bacterial infection (also viral & non-infective causes).

Lower Respiratory Tract Infections

Infective Exacerbation COPD

Antibiotics only if purulent sputum (send for culture along with viral gargle)

Dual antibiotic therapy not recommended & increases risk of harm

Oral ▲Doxycycline 200mg as a one-off single dose then 100mg daily

or Oral Amoxicillin 500mg 8 hrly *or* Oral ▪Clarithromycin 500mg 12 hrly

Duration 5 days

Suspected Viral Respiratory Tract Infection

Antibiotics NOT required unless secondary bacterial infections e.g. COPD exacerbation with purulent sputum (see above)

If consolidation treat as per CAP below

COVID-19 guidelines Flu guidelines

Uncertain if LRTI/ UTI

Send MSSU, sputum and viral gargle

Oral • Co-trimoxazole 960mg 12 hrly *or* Oral ▲Doxycycline 100mg 12 hrly

Do **NOT** prescribe Co-amoxiclav

Review/ clarify diagnosis at 48 hours

Duration if diagnosis remains uncertain **MAXIMUM 5 days**

Pneumonia

Community Acquired Pneumonia (CAP)

Assess for SEPSIS

Calculate CURB 65 score:

- Confusion (new onset)
- Urea > 7 mmol/L
- RR ≥ 30 breaths/ min
- BP – diastolic ≤ 60 mmHg or systolic < 90 mmHg
- Age ≥ 65 years

If patient admitted from a care home treat as CAP.

If severe, ensure atypical screen sent.

Non-severe CAP

CURB65 score: ≤ 2 (and no sepsis)

Oral Amoxicillin 500mg 8 hrly

or Oral ▲Doxycycline 200mg as a one-off single dose then 100mg daily

or Oral ▪ Clarithromycin 500mg 12 hrly

Duration 5 days

Severe CAP

CURB 65 score ≥ 3 or CAP (with any CURB 65 score) PLUS sepsis :

Oral ▪ Clarithromycin 500mg 12 hrly

PLUS either:

IV Amoxicillin 1g 8 hrly

or if requiring HDU/ ICU level care

IV Co-amoxiclav 1.2g 8 hrly

If true penicillin/beta-lactam allergy or Legionella strongly suspected

Oral ▲▪ Levofloxacin **Monotherapy** 500mg 12 hrly

(NB oral bioavailability 99 – 100 %)

Duration 5 days (IV/oral)

Legionella 10-14 days

Hospital Acquired Pneumonia (HAP)

Diagnosis of HAP is difficult and it is often over-diagnosed. Consider other causes of clinical deterioration **including hospital onset COVID-19** and review diagnosis early. Seek senior advice. Assess severity based on CURB 65 score.

If within 4 days of admission or admitted from care home

Treat as for CAP

If ≤ 7 days post hospital discharge or ≥ 5 days after admission:

Non-severe HAP

Oral therapy recommended

Oral ▲Doxycycline 100mg 12 hrly

or Oral • Co-trimoxazole 960mg 12 hrly

Duration 5 days

Trimethoprim use with caution may ⇧ K^+ and decrease renal function. Monitor

Severe HAP

IV Co-amoxiclav 1.2g 8 hourly

+ IV Gentamicin**Δ (max 4 days)

or if true penicillin/beta-lactam allergy

Oral ▲▪ Levofloxacin 500mg 12 hrly monotherapy

Duration 5 days (IV/oral)

If critically ill discuss with Infection Specialist

Aspiration pneumonia

This is a chemical injury and does not indicate antibiotic treatment.

Reserve antibiotics for those who fail to improve within 48 hrs post aspiration.

IV Amoxicillin 1g 8 hrly

or if true penicillin/beta-lactam allergy

IV ▪ Clarithromycin 500mg 12 hrly

+ IV Metronidazole 500mg 8 hrly

Duration 5 days (IV/oral)

****Gentamicin/ **Vancomycin**

Gentamicin / Vancomycin adult dosing calculators are available via 'Clinical Info' icon on staff intranet/ GGC Medicines App. See GGC Therapeutics Handbook for Prescribing advice. Use GGC Prescribing, Administration, Monitoring charts.

Vancomycin If creatinine not available give Vancomycin loading dose as per actual body weight

Gentamicin Δ Avoid Gentamicin in decompensated liver disease or myasthenia gravis, or known family history of aminoglycoside auditory toxicity or maternal relative with deafness due to mitochondrial mutation A1555G

If creatinine not available give gentamicin as follows:

Actual Body Weight	Gentamicin Dose	Actual Body Weight	Gentamicin Dose
< 40 kg	*5 mg/kg*	*60 - 69 kg*	*320 mg*
40 - 49 kg	*240 mg*	*70 - 79 kg*	*360mg*
50 - 59 kg	*280mg*	*≥ 80 kg*	*400 mg*
NB If CKD5 give 2.5 mg/kg (max 180 mg)			

Skin/ Soft Tissue Infections

Mild skin/soft tissue infection

Oral Flucloxacillin 1g 6 hrly

or if true penicillin/beta-lactam allergy

Oral • Co-trimoxazole 960mg 12 hrly

or Oral ▲Doxycycline 100mg 12 hrly

Duration 5 days

Moderate / Severe Cellulitis

Consider OPAT/ ambulatory care (consult local management pathway).

If requires inpatient management:

IV Flucloxacillin 2g 6 hrly

If MRSA suspected or if true penicillin/ beta-lactam allergy

IV Vancomycin**

If rapidly progressive

Add IV Clindamycin 600mg 6 hrly

Consider CDI risk

Duration 7-10 days (IV/oral)

Suspected Necrotising Fasciitis

Consider in SSTI with disproportionate pain or presence of acute organ dysfunction/ hypoperfusion including hypotension.

Seek urgent surgical/ orthopaedic review.

Urgent DEBRIDEMENT/ EXPLORATION may be required

IV Flucloxacillin 2g 6 hrly

+ IV Benzylpenicillin 2.4g 6 hrly

+ IV Metronidazole 500mg 8 hrly

+ IV Clindamycin 1.2g 6 hrly

+ IV Gentamicin**Δ (max 4 days)

If MRSA suspected or if true penicillin/ beta-lactam allergy

REPLACE Flucloxacillin + Benzylpenicillin with IV Vancomycin**

Rationalise therapy within 48-72 hours

Based on: response, microbiology results infection specialist review

Duration 10 days (IV/oral) or as per infection specialist

Infected human/animal bite

Non-severe bite

Oral Co-amoxiclav 625mg 8 hrly

or if true penicillin/beta-lactam allergy

Oral ▲Doxycycline 100mg 12 hrly

+ Oral Metronidazole 400mg 8 hrly

Duration- Treatment: 5 days Prophylaxis: 3 days

See "Adult Antibiotic Wound Management for the Emergency Department" for prophylaxis indications

Severe bite

Consider surgical review.

IV Co-amoxiclav 1.2g 8 hrly

or if true penicillin/beta-lactam allergy

IV Vancomycin**

+ Oral Metronidazole 400mg 8 hrly

+ Oral ▲▪Ciprofloxacin 500mg 12 hrly

Duration 7 days (IV/oral)

Gastrointestinal Infections

Gastroenteritis

Confirm travel history/other risk factors

Antibiotics not usually required and may be deleterious in *E.coli* O157 Consider viral causes

C. difficile infection (CDI)

See CDI Guidelines

Treat before lab confirmation if high clinical suspicion. Discontinue if toxin negative

Intra-abdominal sepsis

IV Amoxicillin 1g 8 hrly

+**Oral**/ IV Metronidazole **400mg /** 500mg 8 hrly

+IV Gentamicin**Δ (max 4 days))

If eGFR < 20 mL/min/1.73 m²

IV Piperacillin/Tazobactam 4.5g 12 hourly (Monotherapy)

If true penicillin/beta-lactam allergy

IV Vancomycin **

+**Oral**/ IV Metronidazole **400/** 500mg 8 hrly

+IV Gentamicin**Δ (max 4 days)

If eGFR < 20mL/min/1.73 m²

▲▪ IV/Oral Ciprofloxacin

+**Oral**/ IV Metronidazole **400/** 500mg 8 hrly

Total Duration 5 days (IV/oral) Assuming source control

See Advice for Antibiotic therapy following 4 days IV gentamicin

Biliary tract infection

As above except metronidazole not routinely required unless severe

Pancreatitis

Does not require antibiotic therapy unless complicated by cholangitis.

Spontaneous Bacterial Peritonitis (SBP)

SBP confirmed if ascitic counts Manual : WCC >500/mm³ or neutrophils >250/mm³ **or** EDTA automated count: WCC >0.5 or polymorphs >0.25 x10⁹/L

See Cirrhosis bundle

If not receiving co-trimoxazole prophylaxis:

Oral • Co-trimoxazole 960mg 12 hourly

If receiving co-trimoxazole prophylaxis:

IV Piperacillin/Tazobactam 4.5g 8 hourly

or if true penicillin/beta-lactam allergy

Oral ▲▪**Levofloxacin 500mg 12 hrly

Duration 7 days (IV/oral)

Decompensated Chronic liver Disease with Sepsis Unknown Source

IV Piperacillin/Tazobactam 4.5g 8 hourly

or if true penicillin/beta-lactam allergy

Oral ▲▪**Levofloxacin 500mg 12 hrly

Duration 7 days (IV/oral)

Urinary Tract Infections

UTI in Pregnancy

See NHS GGC Obstetric guidance

Lower UTI / cystitis

Don't treat asymptomatic bacteriuria. Obtain urine culture prior to antibiotic. In women often self-limiting, consider delayed prescribing.

Antibiotics if significant symptoms ≥ 2 of : dysuria, frequency, urgency, nocturia, haematuria, (and for adult women < 65 years +ve urine nitrite)

Oral Nitrofurantoin 50mg 6 hourly or Nitrofurantoin 100mg MR 12 hourly

or Oral • Trimethoprim 200mg 12 hrly

Duration: Females 3 days, Males 7 days

If eGFR < 30 mL/min/1.73 m²

Nitrofurantoin contraindicated, Trimethoprim use with caution

Upper UTI

Symptoms include: fever, rigors, nausea, vomiting or flank pain.

Exclude pneumonia if loin/back pain.

Obtain urine for culture prior to antibiotic.

Avoid nitrofurantoin, pivmecillinam and oral fosfomycin in Upper UTI.

Non-severe/without sepsis

Oral ▲▪Ciprofloxacin 500mg 12 hrly

Or Oral •Co-trimoxazole 960 mg 12hrly if trimethoprim sensitive organism.

Duration 7 days

Trimethoprim see above re ⇩ eGFR

UROSEPSIS/ Pyelonephritis with fever

IV Gentamicin**Δ (max 4 days)

If eGFR < 20 mL/min/1.73 m²

Oral ▲▪Ciprofloxacin

Duration 7 days

Catheter related UTI

Remove/ replace catheter and send urine for culture. Don't treat asymptomatic bacteriuria

Symptomatic bacteriuria without sepsis

Give single dose of IV Gentamicin**Δ immediately prior to catheter removal or if IV route not available give single dose of oral ▲▪Ciprofloxacin 500mg 30 minutes before catheter change.

If eGFR < 20 mL/min/1.73 m²

▲▪ Ciprofloxacin 500mg single dose

Symptomatic bacteriuria with sepsis

Treat as per pyelonephritis/ culture results.

Duration 7 days (IV/oral)

Suspected prostatitis

Consider in all men with lower UTI symptoms

Refer to Urology

Oral ▲▪Ciprofloxacin 500mg 12 hrly

or Oral • Trimethoprim 200mg 12 hrly if sensitive organism.

Duration 14 days

Bone/ Joint Infections

Septic arthritis/Osteomyelitis / Prosthetic joint infection

Urgent orthopaedic referral if underlying metal work or recent surgery. Obtain blood cultures (and if not acutely unwell/ septic, obtain synovial/ other deep samples) prior to antibiotic therapy

Native joint

IV Flucloxacillin 2g 6 hrly

If MRSA suspected or if true penicillin/beta-lactam allergy

IV Vancomycin**

If considered high risk for Gram negative infection e.g. immunocompromised, recurrent UTI or sickle cell disease:

ADD IV Gentamicin**Δ (max 4 days)

Duration and IVOST: discuss with Infection Specialist at 72 hours. Usually 4-6 weeks (IV/oral) if diagnosis confirmed.

Prosthetic joint

Antibiotic therapy should not be started in a clinically stable patient until intra-operative samples obtained

IV Vancomycin**

+ IV Gentamicin**Δ (max 4 days)

Duration and IVOST: discuss with Infection Specialist at 72 hours

Diabetic foot infection/ osteomyelitis

Assess ulcer size, probes to bone, neuropathy, peripheral vascular disease, MRSA risk. For outpatient therapy consult diabetic clinic guidelines

IV Flucloxacillin 2g 6 hrly

+Oral Metronidazole 400mg 8 hrly

If SEPSIS or SIRS ≥ 2

Add IV **Gentamicin****Δ (max 4 days)

If MRSA suspected or if true penicillin/beta-lactam allergy

IV Vancomycin**

+ Oral Metronidazole 400mg 8hrly

(Metronidazole oral bioavailability 80-100%)

If SEPSIS or SIRS ≥ 2:

Add IV **Gentamicin****Δ (max 4 days)

*If eGFR < 20 mL/min/1.73 m² **REPLACE***

Gentamicin with Oral ▲▪Ciprofloxacin

Duration/IVOST

Discuss with Infection Specialist

Vascular graft infection

IV Flucloxacillin 2g 6hrly

+ IV Gentamicin**Δ (max 4 days)

If MRSA suspected or if true penicillin/ beta-lactam allergy

IV Vancomycin**

+ IV Gentamicin**Δ (max 4 days)

Discuss duration/IVOST/ further management with Infection specialist

CNS Infections

Urgent Blood Cultures then IV Antimicrobial Therapy within ONE hour

LP safe without CT scan UNLESS: seizures, GCS ≤ 12, CNS signs, papilloedema or immunosuppression. If CT: Blood cultures and antibiotics BEFORE CT scan.

Use Meningitis/ Encephalitis order set on Trakcare, Blood and CSF Glucose.

LP contraindicated if: Brain shift, rapid GCS reduction, Resp/ cardiac compromise, severe sepsis, rapidly evolving rash, infection at LP site, coagulopathy, thrombocytopenia, anticoagulant drugs

Possible bacterial meningitis

IV Ceftriaxone 2g 12 hrly

or if previous penicillin anaphylaxis

IV Chloramphenicol 25mg/kg (max 2g) 6 hrly

If bacterial meningitis strongly suspected:

ADD IV Dexamethasone 10mg 6 hrly (for 4 days)

Prior to, or at the same time as antibiotics and refer to ID

If age ≥ 60 years, immunosuppressed, pregnant, alcohol excess, liver disease or if listeria meningitis suspected:

ADD IV Amoxicillin 2g 4 hrly to Ceftriaxone

or if true penicillin/beta-lactam allergy

ADD IV • Co-trimoxazole 30mg/kg 6 hrly to Chloramphenicol

Duration of antibiotics: Discuss with Infection Specialist

Possible viral meningitis

Usually diagnosed after empirical management and exclusion of bacterial meningitis. **Viral meningitis does NOT require antiviral prescription unless immunocompromised.**

Discuss with Infection Specialist.

Confusion or reduced consciousness = Encephalitis NOT meningitis

Possible viral encephalitis

Consider if confusion or reduced level consciousness in suspected CNS infection. Ensure CSF viral PCR is requested. May not be possible to differentiate from bacterial meningo-encephalitis.

IV Aciclovir 10mg/kg 8 hrly

See BNF for dosing in renal impairment.

Discuss **all** patients with infection specialist. May require repeat LP or neuro-imaging to establish diagnosis.

Duration: Confirm with infection specialist

Severe Systemic Infection Source Unknown

Sepsis where source unknown

Review all anatomical systems, perform CXR and consider other imaging/ laboratory investigations

Review previous microbiology results and discuss with an infection specialist if previous gentamicin resistance

Review diagnosis DAILY

Add cover for *S.aureus* infection if; healthcare associated, recent hospitalisation, post-op wound/ line related, PWID

Add cover for MRSA infection if; recent MRSA carrier or previous infection

Add cover for Streptococcal infection if; pharyngitis/erythroderma/hypotension

Source unknown

IV Amoxicillin 1g 8 hrly

+ IV Gentamicin**Δ (max 4 days)

If S.aureus suspected

ADD IV Flucloxacillin 2g 6 hrly

If MRSA suspected or if true penicillin/ beta-lactam allergy

IV Vancomycin**

+ IV Gentamicin**Δ (max 4 days)

If severe Streptococcal infection suspected

ADD IV Clindamycin 600mg 6 hrly

*If eGFR < 20mL/min/1.73 m², **REPLACE***

Gentamicin with Oral/IV ▲▪Ciprofloxacin

Duration: Review with response/ micro results at 72 hours

Possible Infective Endocarditis

Always seek senior specialist advice and refer to cardiology.

Native heart valve

IV Amoxicillin 2g 4 hrly

+ IV Flucloxacillin 2g 6 hrly if < 85kg (4 hrly if ≥ 85kg)

+ IV Gentamicin Δ (°synergistic dosing)

If MRSA/ resistant organisms suspected or if true penicillin/beta-lactam allergy

IV Vancomycin**

+ IV Gentamicin Δ (°synergistic dosing)

Prosthetic heart valve

IV Vancomycin**

+ IV Gentamicin Δ (°synergistic dosing)

Discuss with Infection Specialist within 72 hours

°See Synergistic Gentamicin for Endocarditis in Adults guideline on StaffNet for dosing

Immunocompromised Patient

Immunocompromised Patient

Recent Chemotherapy (< 4 weeks), high dose steroids (e.g. prednisolone > 20 mg/day for > 2 weeks), other immunosuppressants (e.g. anti-TNF, cyclophosphamide), Stem cell/solid organ transplant or primary immunodeficiency

Neutropenic Sepsis

Neutrophils ≤ 0.5 x 10⁹/ L + fever (temperature > 38°C or 37.5°C on 2 occasions 30 min apart) / hypothermia < 36°C **OR** chills, shivers, sweats or other symptoms suggestive of infection. Patients who have received recent chemotherapy (neutrophils < 1x10⁹/L) and who exhibit any of the symptoms above are presumed to be neutropenic and septic.

Immunocompromised with fever BUT normal neutrophils AND source of infection identified

Manage as per infection management guidelines based on anatomical source.

Neutropenic sepsis or Immunocompromised with fever and source of infection unknown;

See guideline Initial Management of Neutropenic Sepsis or Sepsis of Unknown Source in Immunocompromised Adults which is available on StaffNet by clicking:

→Clinical Info

→NHSGGC Clinical Guideline Platform

→Adult infection Management

→Secondary Care - Treatment

neutropenic-sepsis-or-sepsis-of-unknown-source-in-immunocompromised-adults.pdf (scot.nhs.uk)

Patients with Stem Cell Transplant or receiving chemotherapy for Acute Leukaemia

NEWS ≤ 6 See High Risk treatment above.

NEWS ≥ 7 Critical Risk

See Neutropenic Sepsis guidelines (see above for pathway to this on StaffNet)

!! Important Antibiotic Drug Interactions & Safety Information !!

▲**Doxycycline/ Quinolone:** reduced absorption with iron, calcium, magnesium & some nutritional supplements. See BNF (Appendix1) or see pharmacy for advice.

▪**Clarithromycin/ Quinolone:** risk of serious drug interactions see BNF (appendix 1) or seek pharmacy advice. May also prolong the QTc interval, avoid (where possible) if other QTc risk factors. If oral route compromised give IV (see BNF for dose).

▲▪**Quinolones e.g.** Ciprofloxacin, Levofloxacin Stop treatment at first signs of a serious adverse reaction (e.g. tendonitis), prescribe with caution for people over 60 years and avoid co administration with a corticosteroid. See BNF for dosing advice in reduced renal function.

Trimethoprim • / Co-trimoxazole• Use with caution, may increase K+ and decrease renal function. Monitor U+Es. If oral route compromised, co-trimoxazole can be given IV (see BNF for dose).

INFECTION SPECIALISTS: Duty Microbiologist, Infectious Disease (ID) Unit at QEUH. **FOR FURTHER ADVICE:** Clinical/Antimicrobial Pharmacist , local Respiratory Unit (for RTI) or from GGC Therapeutic Handbook.
Infection Control advice may be given by Duty Microbiologist

Latest Version: https://rightdecisions.scot.nhs.uk/ggc-clinical-guidelines/adult-infection-management/secondary-care-treatment/hospital-infection-management-guidelines-empirical-antibiotic-therapy-in-adults-165/

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