Appendix 1:

Positive BC Cheat Sheet (Adults): Gram negative bacilli (GNB)

Likely organisms[1]

- Highly likely to be clinically significant, and rarely represents contamination

Total % of GNB bacteraemias:	
88%	**Enterobacterales:** e.g. E. coli, Klebsiella, Proteus, Enterobacter, Serratia
5%	**Pseudomonas[#]:** e.g. Pseudomonas aeruginosa (>95%)
4%	**Anaerobes[$]:** e.g. Bacteroides, Capnocytophaga, Prevotella, Fusobacterium
3%	**Other[#]:** e.g. Acinetobacter, Achromobacter, Aeromonas, Stenotrophomonas

[#] Likely to grow in aerobic bottle only; often associated with healthcare-associated infections / immunocompromised host.

[$] Usually as part of a polymicrobial infection.

Commonest sources of infection

- Refer to **Empirical Antibiotic Guidelines for Secondary Care (Adults)** for condition-specific antibiotic recommendations:
  - https://tinyurl.com/NHSDG-EmpiricalAbxGuidance

Community onset infections	*Healthcare-associated / Hospital-onset infections*
• Urinary tract • Biliary tract e.g. cholecystitis, cholangitis • Intra-abdominal e.g. appendicitis, diverticulitis, peritonitis, perforated viscus	*As per community onset, plus:* • Catheter-associated urinary tract • Line-related bacteraemia • Post-operative infection (esp. Intra-abdominal) • *Less frequently: Hospital-acquired pneumonia:*
GNBs in BCs should cast doubt on diagnoses such as Respiratory tract infection, Skin and soft tissue infection and Meningitis.	

Predicted susceptibilities[1]

- **Always review previous microbiology results** to look for previous resistant organisms and/or susceptibilities to help guide antimicrobial choices

*Examples of commonly used antibiotics with **NO (OR LIMITED) ACTIVITY** against GNBs:*
• Benzylpenicillin, Flucloxacillin, **Amoxicillin** • Erythromycin, Clarithromycin • Doxycycline • Teicoplanin, Vancomycin, Daptomycin • Linezolid • *GNB Anaerobes only:* clindamycin, metronidazole

*Examples of commonly used antibiotics with activity against GNBs, but **SHOULD BE AVOIDED IN BACTERAEMIAS**, except on specialist advice:*
• Nitrofurantoin • Fosfomycin • Cefalexin • Pivmecillinam

If your patient is on these agents, e.g. for a diagnosis of CAP, cellulitis or lower UTI, then an urgent review and a change in antibiotic treatment is highly likely to be required.

[1] Data produced from analysis of de-duplicated positive BCs isolates isolated in NHS D&G from July 2022-2025

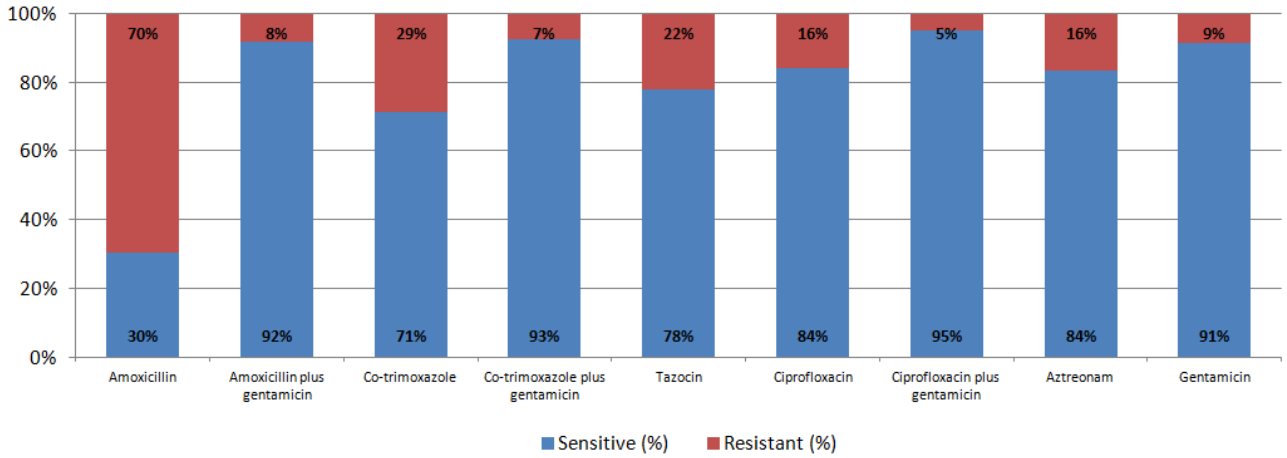
Commonly used antibiotics that are likely to provide sufficient empirical cover against GNBs in BCs

Co-trimoxazole, Gentamicin, Ciprofloxacin, Aztreonam, Temocillin, Cephalosporins, Carbapenems

The most appropriate agent depends on many factors including, but not limited to: allergies, renal function, source of infection, likely organism, previous antibiotic resistance, previous antibiotic exposure, choice of mono- or combination therapy.

If Pseudomonas suspected: refer to Pseudomonas section for most appropriate choices

Enterobacterales summary



If your patient is on one or more of these antibiotics and clinically stable, then a change in treatment is unlikely to be required when a BC is first reported with a GNB, when an Enterobacterales is suspected. Strongly consider a broader regimen (e.g. add gentamicin) if on amoxicillin/co-amoxiclav monotherapy, until susceptibilities available

Pseudomonas

- >90% of BC isolates are susceptible to:
  - Increased dose ("I") tazocin **/** ciprofloxacin **/** aztreonam / ceftazidime
  - Standard dose ("S") meropenem
  - Dosed appropriately, agents reported as "I" and "S" are equally likely to result in successful treatment
  - For dosing guidance to *"Dosing for isolates reported as I: Adults" in the NHS D&G Antibiotic Handbook*:
    - https://rightdecisions.scot.nhs.uk/nhs-dumfries-galloway-antimicrobial-handbook/additional-resources-incl-dosing-generaldrug-specific-advice-pils-sapg-guidance/general-antimicrobial-prescribing/)
- Gentamicin
  - >90% have no acquired resistance, however other anti-pseudomonal agents may be more active
  - Generally avoid using gentamicin as a single agent outside of urinary tract infections
  - Avoid in respiratory tract infections as lung tissue penetration is poor
- Examples of commonly used antibiotics to treat Enterobacterales that have **no activity against Pseudomonas**
  - Amoxicillin / co-amoxiclav / co-trimoxazole / temocillin

Anaerobes

- >90% of BC isolates are susceptible to the following antibiotics with anaerobic activity:
  - Metronidazole / Co-amoxiclav / Tazocin / Clindamycin
  - *Dual cover with two agents with activity against anaerobes is rarely required*
- Examples of commonly used antibiotics to treat Enterobacterales that have **little/no activity against Anaerobes**
  - Amoxicillin / Co-trimoxazole / Gentamicin / Ciprofloxacin / Aztreonam / Temocillin / Cephalosporins
  - *Empiric regimens for suspected polymicrobial infections (e.g. intra-abdominal sepsis) usually include metronidazole to provide anaerobic cover*

Other: e.g. Acinetobacter, Achromobacter, Aeromonas, Stenotrophomonas

- Uncommon, and susceptibility patterns unpredictable
- *Seek advice from senior clinician*

Suggested actions when BC with GNB initially phoned through

- **Review patient**. Determine clinical status, likely focus of infection, current antibiotics
- **If NEWS score ≥7, request senior review**
- **Review past microbiology results.** Look for previously isolated Gram negatives with reported resistance to currently prescribed antibiotic therapy, gentamicin or temocillin. Consider likely organism based on clinical picture. Does the current therapy cover known resistant organisms?
- **Consider whether antibiotic adjustment is required.** Suggested actions to consider are listed below:

If... your patient is on an antibiotic regimen likely to provide sufficient empirical cover AND clinically stable

➔ Change in treatment is unlikely to be required at this stage.

If... your patient is on an antibiotic regimen likely to provide sufficient empirical cover BUT clinically deteriorating / acutely unwell

➔ **Seek urgent senior clinical review**

➔ **Undertake antimicrobial review, including:**

- *Previous microbiology results*: resistance, likely culprit organisms
  - If current empiric therapy does not cover a previously isolated AND likely causative resistant organism, then IMMEDIATE CHANGE is required. Choose an agent reported as "S" or "I", avoiding agents not suitable to treat GNB bacteraemia (as detailed under "Predicted susceptibilities")
- *Current therapy:* route, dosing, administration
- *Source control:* is there a deep-seated infection that needs draining? Consider imaging/surgical input

➔ **Gentamicin**: if not yet started (or only stat dose given) AND there is no previous resistance AND there no contra-indications (e.g. myasthenia gravis):

- Commence regular IV gentamicin, dosed as per gentamicin calculator
  - If stat dose: the timing of the next dose should be determined using as per the *"Gentamicin (Adults): Prescribing, Administration and Monitoring Chart"*. If in doubt, seek pharmacy advice. **Avoid double dosing.**
- Alternatives to gentamicin may include:
  - IV temocillin – avoid in penicillin allergy, if Pseudomonas recently isolated, or known resistance. *Use increased dose, adjusted for renal function.*
  - IV aztreonam – avoid with ESBL, or known resistance.

➔ Further escalation options and management advice is available within:

"The "Life Jacket": Urgent Antimicrobial Management for Acutely Deteriorating Adult Patients ≥16 years old when Immediate Microbiology Consultant Advice Is Unavailable"

If... your patient is NOT ON ANTIBIOTICSs OR on an antibiotic regimen with NO or LIMITED activity against GNBs

➔ If no features of sepsis OR obvious source of infection, take a further set of blood cultures

➔ **Change in antibiotic treatment is likely to be required** – *GNBs are usually significant*

- *Likely source of GNB identified*:
  - Adjust antibiotic regimen in line with empiric antibiotic guidance
    AND
  - Review previous susceptibilities and predicted susceptibilities to ensure regimen likely to provide appropriate GNB cover
- *Source unclear OR unlikely source of a Gram negative bacteraemia (e.g. skin and soft-tissue infection, pneumonia)*
  - Start/add/switch cover in line with guidance for empirical treatment of sepsis of unknown origin.

➔ Seek senior clinical review / discussion