DRUGS – a crib-sheet about commonly used antibiotics

The pathogens referred to will all be ones mentioned in the BUGS crib-sheet. It's advisable to be familiar with that first.

To see what to use for specific clinical conditions, check your Health Board policies on the Rx Guidelines app – these may vary but they are all based on the principles below

1. **Table of some antibiotic classes**
2. **Key facts about some important classes of antibiotics**
3. **Quick list of some important pathogens and what to use**

1. **Table of some antibiotic classes**

There are a huge number of antibiotics. The best thing is to consider them by class.

This table lists some of the commonest antibiotic classes, and examples of each. Antibiotics in PURPLE mainly cover Gram positive organisms; antibiotics in RED mainly cover Gram negative organisms (also appear as + or – respectively for those with difficulty distinguishing colours). The beta-lactams are a huge group which cannot be distilled in this way so appear in green.

You can find similar more detailed information by following the Antibiotic Quick Reference Guide link in the 'Bugs, Drugs and Resources' section of the website.

After the table, there are some key facts about each of these classes.

Antibiotic class	Example antibiotics
Beta-lactams	Penicillin, Flucloxacillin, Co-amoxiclav (Augmentin®), Piperacillin-tazobactam (Tazocin®), cephalosporins, carbapenems
Tetracyclines +	Doxycycline, Tetracycline
Glycopeptides +	Vancomycin, Teicoplanin
Macrolides +	Clarithromycin, azithromycin, erythromycin
Quinolones -	Ciprofloxacin
Aminoglycosides -	Gentamicin, amikacin

2. **Key facts about some important antibiotic classes**
   a) Beta-lactams
   b) Tetracyclines
   c) Glycopeptides
   d) Macrolides
   e) Quinolones
   f) Aminoglycosides
   g) Metronidazole
   h) Nitrourantoin

a) Beta-lactams

Well over half of UK antibiotic prescriptions are for beta-lactams. Overall very safe with few toxicities, apart from allergy in <1% of patients. This huge group can be broken down as follows:

Beta lactam antibiotics	Notes
Penicillins *Penicillin*	Penicillin V (oral) or benzylpenicillin (i.v.): oldest and original antibiotic! Narrow spectrum but still useful for streptococci including *Streptococcus pneumoniae* and *Streptococcus pyogenes.* Therefore often used for tonsillitis and skin infections.
Flucloxacillin	Narrow spectrum. Agent of choice for *Staphylococcus aureus* infections.
Amoxycillin	Amoxycillin: broader spectrum but c. 50% of *E. coli* is now resistant. Useful for enterococci or streptococci.
Cephalosporins e.g. *cefuroxime, cefotaxime, ceftriaxone*	Broad spectrum. Use has become more restricted now with perception of greater risk of *C. difficile* infection. First line for bacterial meningitis (ceftriaxone)
Carbapenems e.g. *meropenem, imipenem*	Very broad spectrum. Reserved for critical care/ immunocompromised patients but increasing resistance mean we are using them more. Carbapenem resistant *Klebsiella* is an emerging and very worrying problem in UK hospitals.
Beta-lactamase inhibitor combinations e.g. co-amoxiclav (Augmentin®), piperacillin-tazobactam (Tazocin®)	Some bacteria become resistant to beta-lactams by producing beta lactamase enzymes which destroy the antibiotics. These enzymes can be inhibited using inhibitors. The inhibitors can be combined with a beta-lactam antibiotic to protect the antibiotic. Augmentin® and Tazocin® are examples of such combinations. 'Arms race' scenario!

b) Tetracyclines eg tetracycline, doxycycline

Doxycycline can be used for **chest infections**, where the most important pathogen is ***Streptococcus pneumoniae*** (Gram positive). It also covers **'atypical' pneumonia** organisms such as *Mycoplasma* (see BUGS sheet) so it's very useful for chest infections.

c) Glycopeptides e.g. vancomycin, teicoplanin

Easy to remember – cover **nearly all Gram positives**. Useful for **MRSA** but can only give parenterally, as not absorbed from GI tract. The only exception is the use of oral vancomycin for *C. difficile* infection, where infection is in the lumen of the gut. This makes sense as *C. difficile* is Gram positive (see BUGS crib-sheet).

d) Macrolides e.g. clarithromycin

These are mainly Gram positive agents. They are used in general practice for **staph and strep infections when a patient is allergic to penicillin**: for example, **tonsillitis, minor skin infections**.

Like doxycycline they also cover **'atypical' pneumonia** organisms so they are often used **with amoxycillin for community acquired pneumonia**.

e) Quinolones e.g. ciprofloxacin

Particularly useful for *Pseudomonas*, as they are the only oral antibiotics active against this organism. Very good oral bioavailability means i.v. route is seldom needed.

f) Aminoglycosides e.g. Gentamicin, amikacin

These are usually reserved for serious **Gram negative sepsis**. i.v. only. Ototoxic (hearing loss) and nephrotoxic so have to measure serum levels to ensure they are in the correct range. We had stopped using them much after cephalosporins became available, but now they are being used much more again, because of increasing drug resistance and the perceived greater risk of *C. difficile* with cephalosporins.

Class of their own!

g) Metronidazole Covers all **anaerobes**. Very good oral bioavailability.

h) Nitrofurantoin Great for **UTI** – 95% of *E. coli* is sensitive- but only gets to therapeutic concentrations in urine

3. **Quick list of some specific pathogens and what to use:**

Staphylococcus aureus	Flucloxacillin
Streptococci	Penicillin
Pseudomonas	ciprofloxacin (only oral option), gentamicin, Tazocin®, ceftazidime, meropenem are the only real options for this very resistant organism.
Anaerobes	They are all sensitive to metronidazole. Also co-amoxiclav (Augentin®), Tazocin®, carbapenems all give good cover so you don't need both.
E. coli/Klebsiella	For UTI, nitrofurantoin good; resistance to trimethoprim is increasingly common. For serious infections/sepsis, gentamicin or Tazocin® are effective – check local antibiotic policies. Carbapenems only if very resistant.
'Atypical' pneumonia organisms	Macrolides, tetracyclines, quinolones