



7.0 . Medications

The next two sections contain a significant amount of technical information. It is intended as a very brief overview and introduction of the subject area. I accept no responsibility for the accuracy or otherwise of this material. The following are more specific references for these topics :

Antibiotics

- Antibiotic Guide 1996. S. Lang. ADIS Press. 1995. (Local NZ book, most university hospitals produce similar)
- [Handbook of Antibiotics](#), R. Reese. Little Brown and Co. 1993
- Here's a suggestion from Captain Dave: [Pocket Handbook of Infection Agents and Their Treatments : A Quick Reference to Microbial Agents and the Drugs of Choice](#), by Nancy Hartman, Daniel Shapiro, Avery Publishing Group.

Microbiology

- [Microbiology : An introduction](#). G. Tortora. Benjamin & Cummings 1997 ISBN 0805385355
- Medical Microbiology and Immunology. Levinson. Lange 1996. ISBN 0838562256
- [Clinical Microbiology Made Ridiculously Simple](#). Mark Gladwin. Medmaster 1997. *** Excellent. My choice.***

Laboratory Medicine

No ideal book in this section, but these are a couple of suggestions.

- [Clinical Laboratory Medicine](#). K. McClatchey. Williams & Wilkins, 1994.
- [Medical Laboratory Haematology](#). 2nd Ed. Butterworth.

7.1 Storage and Rotation of Medications

Medications can be one of the more expensive items in your storage inventory and there can be a reluctance to rotate them due to this cost issue and also due to difficulties in obtaining new stock.

Unfortunately, drugs do have limited shelf life. It is a requirement for medications sold in the US (and most other first world countries) to display an expiration date. It is my experience that these are usually very easy to follow, without the confusing codes sometimes found on food products, e.g. -- Exp. 12/00=December 2000.

I cannot endorse using medications which have expired. But having said that it is my understanding that the majority of medications are safe for at least 12 months following their expiration date. A colleague recently did some aid work in the Solomon islands and a local pharmaceutical warehouse gave him a number of expired drugs. They stated that the drugs were safe to use for at least another 18 months. As with food the main problem with expired medicines is not that they become dangerous, but that they lose potency over time, and the manufacturer will no longer guarantee the dose/response effects of the drug. The *important exception* to this rule is the tetracycline group of antibiotics, which can become toxic with time, there may be others that I am unaware of but it is very difficult to obtain this information. Let the buyer beware, the expiry dates ARE there for a reason.

In addition, I recommend that if you are acquiring medications on a doctor's prescription that when you have the prescription filled you explain the medications are for storage (you don't need to say exactly what for), and request recently manufactured stock with distant expiration dates.

The ideal storage conditions for most medications is in a cool, dark, dry environment. These conditions will optimize the shelf life of the drugs. A small number of drugs require refrigeration to avoid loss of potency. These include insulin, ergometrine, oxytocin and some muscle relaxants. Others such as Diazepam rapidly lose potency if exposed to the light.

7.2 Antibiotics

7.2.1 Antibiotic Recommendations

Antibiotic Recommendations. In some cases access to antibiotics may be very limited. The following is my preferred list of antibiotics. If your limited in what you can get, I suggest you purchase and expand in this order. All are good broad spectrum antibiotics and have different strengths and weakness. I suggest you purchase an antibiotic guide, most medical book shops have small pocket guides for junior doctors detailing which drug to use for which bug and outlining sensitivities.

1. A Broad spectrum Penicillin (e.g.-- Amoxycillin+ Clavulanic Acid)
2. A Quinolone (e.g.-- Ciprofloxacin)
3. A Cephalosporin (e.g.-- Cefaclor)

NOTE: If allergic to Penicillin, I would advise A Quinolone as a first choice with some Metronidazole as a anerobe back-up. Alternative would be Erythromycin.

7.2.2 Antibiotic Summary

The Bugs:

A basic understanding of how bugs (read bacteria) cause infections is required to appropriately use antibiotics. I will not discuss viral or other infective agents here. This is not the forum for a proper discussion, so consider this a brief introduction. There are HUNDREDS of bacteria, I will only discuss common disease causing ones in man.

Four Classes of Bacteria

1. Gram positive (+ ve)
2. Gram negative (- ve)
3. Anaerobes
4. Others

Gram positive bacteria stain blue and gram negative bacteria stain pink, when subjected to a gram staining test. It is related to the presence or absence of a coating in the cell wall of the bacteria. Anaerobic bacteria are ones which require no oxygen to grow. Bacteria are also described by their shape (cocci = round, bacilli = oval) and how they are grouped together (chains, clusters, pairs)

Gram Positive Bacteria (Gram +ve)

- Staphylococcus: Commonest pathogen is *S. aureus*. Gram + cocci in clumps. Causes boils, abscesses, impetigo, wound infections, bone infections, pneumonia (uncommonly), food poisoning and septicaemia. Generally very sensitive to Flucloxacillin as first choice and Augmentin and the Cephalosporins. A strain which is resistant to the above, known as MRSA and is currently treated with vancomycin.
- Streptococcus: Gram + cocci in pairs or chains. Most are not pathogenic in man, except *Strep pneumoniae* and the *Strep pyogenes*. *Strep pneumoniae* causes pneumonia, ear infections, sinusitis, meningitis, septic arthritis, and bone infections. *Strep pyogenes* causes sore throats, impetigo, scarlet fever, cellulitis, septicaemia and necrotising fasciitis. Very sensitive to penicillins, cephalosporins, and the quinolones.

Gram Negative Bacteria (Gram -ve)

- *Neisseria meningitidis*: Gram -ve cocci in pairs. Common cause of bacterial meningitis, may also cause pneumonia and septicaemia. Can be rapidly fatal. Sensitive to penicillins, cephalosporins, quinolones, cotrimoxazole and tetracyclines.
- *Neisseria gonorrhoeae*: Gram -ve cocci in pairs. Causes gonorrhoea. Sensitive to high dose amoxicillin (single dose), Augmentin and also cephalosporins and quinolones.
- *Moxella catarrhalis*: Gram -ve cocci in pairs. Common cause of ear and sinus infections, also chronic bronchitis exacerbations. Sensitive to Augmentin, Cephalosporins, Quinolones and Cotrimoxazole and tetracyclines.
- *Haemophilus influenzae*: Gram -ve cocco-bacilli. Can cause meningitis (esp. in children under 5), epiglottitis, cellulitis and a sub group cause chest infections. Sensitive as *M.catarrhalis*
- *Escherichia coli*: Gram -ve bacilli. Normally found in the bowel. Causes Urinary infections, severe gastroenteritis, peritonitis (from bowel injury), septicaemia. Drug of choice is a quinolone or cephalosporin.
- *Proteus sp.*: Gram -ve bacilli. Lives in the bowel. Causes UTI's, peritonitis (from bowel injuries), wound infections. Drug of choice is the quinolones.

Anaerobes

- *Bacteroides sp.* gram negative bacilli. Normal bowel flora. Commonly causes infections following injury to the bowel or wound contamination, causes abscess formation. Treated first choice with metronidazole or

- second with chloramphenicol or Augmentin.
- Clostridium sp. Gram positive species. produce spores and toxins.
- C. perfringens/C.septicum - common cause of gangrene, treat with penicillins or metronidazole
- C.tetani - tetanus - For tetanus and botulism, the damage is from toxins, not the bacteria themselves
- C. botulinum - botulism
- C. difficile - causes diarrhea following antibiotics. treat with metronidazole

Others

- Chlamydia sp: Includes C.pneumonia, responsible for a type of atypical pneumonia and C.trachomatis, responsible for the sexually transmitted disease chlamydia. It is best treated with Tetracyclines or as second choice a macrolide.
- Mycoplasma pneumoniae: A cause of atypical pneumonia. Treated best with a Macrolide, with a second choice of a tetracycline.

The Drugs

- *Penicillins* - These act by preventing replicating bacteria from producing a cell wall. A number of bacteria produce an enzyme which inactivates the penicillins (B-lactamase).

A number of varieties:

- *Benzyl Penicillin*: Injectable preparation. Antibiotic of choice against severe Strep pneumoniae and Neisseria sp infections such as chest infections, meningitis and cellulitis.
- *Phenoxymethylpenicillin (Penicillin V)*: Oral preparation of above. Usually used only for the treatment of sore throats (strep throats), in other infections largely replaced by amoxicillin which is better absorbed.
- *Flucloxacillin*: Oral and IV drug of choice for Staph infection such as cellulitis, boils and abscess and bone infections. Also usually effective against Strep, but not first choice.
- *Amoxicillin: (newer version of ampicillin)*: Oral and IV. Effective against most gram positive and negative bugs. Limited use secondary to B-lactamase resistance in many bugs. This is overcome with the addition of Clavulanic Acid (e.g. Augmentin). Overcoming this resistance, makes this combination my ideal survival antibiotic, with good gram positive, negative and anaerobic cover. This drug I

feel is the best "broad spectrum" antibiotic commonly available, other AB's may be better for specific infections but this is the best all purpose one.

- *Cephalosporins* - Same method of action as penicillins. Developed in three generations (now four, but not widely available). The third generation e.g., Cefotaxime (Claforan, IV only) and Ceftriaxone (Rocephin, IV only) have the most broad spectrum. They are effective against most gram positives and negatives and some variable anaerobic cover. The second generation e.g., Cefuroxime (Zinacef, oral and IV) and Cefaclor (Ceclor, oral only) also have good general cover, but are not as effective against some gram negative bacilli. This loss of gram negative cover expands to most gram -ve cocci and bacilli in the first generation cephalosporins e.g., Cephalexin (Keflex, oral only) and Cephazolin (Kefzol, IV only). The third generation is ideal for use in those with very severe generalized infection, meningitis or intra-abdominal sepsis (e.g., penetrating abdo wound or appendicitis, with metronidazole added in) and the second generation offer a good broad spectrum antibiotic for general use in skin, wound, urinary and chest infections.
- *Quinolones* - Acts by inhibiting DNA replication in the nucleus of the replicating bacteria. New generation of antibiotics. Most common is Ciprofloxacin. Very broad spectrum cover, except anaerobes. Excellent survival AB, but my second choice due to amoxicillin + clavulanic acids better cover of anaerobes. Effective for most types of infections except intra-abdominal sepsis and gangrene.

Macrolides - Acts by inhibiting protein synthesis in the replicating bacteria. Includes Erythromycin and the newer Roxithromycin and Clarithromycin. Often used in people with a penicillin allergy, however it does have a reduced spectrum (esp. with Gram negatives), but is an alternative to tetracycline in Chlamydia. First choice in atypical pneumonias e.g., with *Mycoplasma pneumoniae*.

- *Co-Trimoxazole* - Acts by interfering with folate metabolism in the replicating bacteria. Previously a very broad spectrum antibiotic, now has a much more variable response rate due to resistance. Still useful for urinary and, mild chest infections.
- *Metronidazole* - Acts by directly damaging the structure of the DNA of the bacteria/protozoa. Drug of choice for anaerobic infection. Should be used with another broad spectrum AB in any one with possible fecal contamination of a wound or intra-abdominal sepsis (such as severe appendicitis). Also the drug of choice for parasitic infections such as *Giardia*.
- *Others* - There are many other antibiotics available. I have only discussed

the common ones above. For further information I refer you to any Antibiotic guide, of which there are many.

NOTE

In pregnancy Penicillins and Cephalosporins are safe. Many others are not (or only during certain parts of the pregnancy). You should always check if any drug you are using is safe, before using in pregnancy and breast feeding. The PDR will tell you. If you want a specific reference try "Drugs in Pregnancy", Ed D.F Hawkins.

[Next](#) | [Previous](#) | [Top](#) | [Table of Contents](#) | [Home](#)