Medicine for Managers

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Antibiotics – the great development

Last week I wrote about antibiotics in nature, the way in which they were discovered and developed and the problems with which we are now beset. In this second article I want to look at what is available, how and for what it is used, when it should (and should not) be prescribed and how we manage the problems associated with the class of drugs.

Nobody would argue about the huge value of the prevention and treatment of infections. Even in my practising lifetime I have seen dramatic changes. During my studentship one large component was in the treatment of infections and whole hospitals were designated 'infectious disease units'.

Things have moved on but now we are confronted by the doom predictors of epidemics of bacterial infections sweeping across the globe wiping out huge numbers of people because of a lack of any effective antibiotic. Currently there are some antibiotic resistant infections and many will have heard of bacteria such as:

- Clostridium difficile
- MRSA (methicillin resistant Staphylococcus aureus)
- The emergent forms of Mycobacterium tuberculosis
- To so-called flesh-eating superbugs – necrotising fasciitis

However they currently compose only a very small proportion of all infections but there are fears that a doomsday bacterium may arise as a virulent mutation from one of these organisms.

Currently we have a number of classes of antibiotic and many of them are 'horses for courses'. Some are used for relatively minor medical problems whilst others are for truly life-threatening conditions.

They can be administered in tablet form, by injection, as a cream or ointment or by lotion, drops or spray.

In some cases the formulation may be a matter of choice whilst in other circumstances antibiotics may be administered only by certain routes because they are toxic or ineffective if given in particular ways.

It is essential to reiterate that, by whatever route the antibiotic is prescribed, it is important to complete the recommended course (except in extreme circumstances such as serious toxicity or allergy) because stopping the drug part of the way through the course may result in insufficient antibiotic exposure to destroy the bacterium whilst affording the opportunity for mutations, which are resistant, to form.

Although there are many different types and formulations of antibiotics, they virtually all fall into six groups:

- Penicillins
- Cephalosporins
- Tetracyclines
- Aminoglycosides
- Macrolides
- Quinolones

I am sure most people's eyes are glazing over so I shall only use the names as paragraph headings!

Examples of the drugs in each group are:
Penicillins: *Benzyl penicillin, penicillin V, amoxicillin, ampicillin, co-amoxiclav, pivmecillinam, flucloxacillin, etc.*
Cephalosporins: *Cefaclor, cefadroxil, cephalexin, cefotaxime, Cefradine, cefuroxime, etc.*
Tetracyclines: *tetracycline, oxytetracycline, doxycycline, lymecycline*
Aminoglycosides: *Gentamycin, streptomycin, tobramycin, chloramphenicol*
Macrolides: *Azithromycin, erythromycin, clarithromycin*
Qunolones: *Ciprofloxacin, moxifloxacin, nalidixic acid, ofloxacin*
There are over six hundred individual antibiotic compounds but virtually all readers will be familiar with a number of the compounds above.

For the prescribing doctor there are two key factors which determine antibiotic choice; the patient and nature of the infection.
Patient factors include:

- History of allergy
- Liver and kidney dysfunction or failure
- Immunity problems (e.g. HIV)
- Severity of the illness
- Age, ethnic status, weight
- Other medication
- In females whether pregnant

Clearly different infections may be caused by different organisms which are sensitive to different antibiotics and therefore it is important to select the most appropriate antibiotic unless or until a suitable specimen has been cultured and the specific organism and an antibiotic which works against it has been identified.

Certainly, wherever possible, samples should be taken befor an antibiotic is prescribed empirically if that is possible.

Antibiotics are not without problems. They commonly have side effects. The most common, particularly when antibiotics are taken by mouth, are those affecting the

bowel. Nausea, vomiting, indigestion, bloating, abdominal pain or diarrhoea may occur.

This is often because the antibiotics, taken to destroy harmful bacteria, also destroy the good bacteria in the gut allowing pathogens (symptom producing organisms which are resistant to the antibiotic) to thrive.

There are many other less common side effects and some people show allergic reactions to antibiotics prescribed. Such reactions vary from minor rashes to full blown anaphylactic shock which can be life threatening. Fortunmately such reactions are very rare.

In modern medicines another problem with antibiotics is the interaction of the drugs with the host of other medications used these days. It is almost impossible for doctors to keep abreast of all the side effects and interactions.

These days doctors tell patients to read the enclosed booklets very carefully and if they spot warnings relating to any other drug they are taking, they should report it to the GP immediately.

Of course, not all antibiotics are taken to ***treat*** infections; others are used to ***prevent*** infections. This process is called prophylaxis. They are commonly used for prevention in surgery where they are given before procedures where bacteria may be present to stop them spreading during the operation. Sometimes a course of antibiotic is used in people in close proximity when a diagnosis of meningococcal meningitis is made to reduce the risk of them acquiring the disease. Prophylaxis is also used in joint replacement surgery, pacemaker surgery, gall bladder surgery and other complex surgical procedures.

Another apparent mystery is why some people get antibiotics whilst others do not, despite the symptoms being similar.

The answer to that is complex. Just because symptoms are similar, it does not mean that the cause is the same.

For example a viral and a bacterial chest infection may produce the same symptoms but an antibiotic is useless for the viral but often invaluable for the bacterial infection.

Furthermore there are intrinsic factors which require the use of antibiotics in particular groups; patients over 75, young children, those with diabetes or heart failure, those whose immune systems are damaged and often those who are weakened from any other cause.

Antibiotics are, as I have said several times, literally life savers in millions of circumstances.

However, their efficacy is falling as more and more resistance develops. So I end with a sermon about the dos and don'ts of antibiotics:

Always complete a course if prescribed.
Don't keep those that are left when the symptoms have gone to use again 'if they come back' or 'if something new develops'.

Never give antibiotics to a friend because you have got some spare ones.
Please believe that viral infections **cannot** be treated with antibiotics.
Infections that were diagnosed as viral **do not** become bacterial and sensitive to antibiotics just because the symptoms have lasted more than five days.

Just because someone got an antibiotic for a cough, does **not mean** that someone else will need an antibiotic because they have a cough too.

Never buy antibiotics from the internet

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