Antibiotic resistance and the prescribing dilemma

Community is usually a relatively harmless parasite.

But in hospitals it can be very dangerous. Hospitals are where antibiotics are most intensively used, and where the germs develop their immunity. Also, there is a higher concentration of people with diseases and open wounds. Often, health care staff are carriers of the bug, without realising it.

There is no known vaccine for MRSA. Certain strains can be treated with expensive antibiotics – but using them carries the risk of developing a mutant strain that is resistant to new treatments.

Stringent infection control measures are the best defence against MRSA but one study found that less than half of health care staff complied with handwashing regulations (Girou et al, 2002).

Nurse prescription of antibiotics

The current guidance on nurse prescribing states that independent nurse prescribers can prescribe general sales list and pharmacy medicines that GPs can currently prescribe, plus some prescription-only medicines.

This is designed to enable nurses to manage a range of specified medical conditions, including minor ailments and minor injuries, as well as engaging in health promotion and palliative care.

Under the Nurse Prescribers’ Extended Formulary nurses can prescribe antibiotics for a range of conditions including acne and lower urinary tract infections (Box 2).

However, bearing in mind the findings of the study into pneumonia deaths it is crucial that nurse prescribers keep themselves informed of any changes in the guidelines to ensure the safe prescription of antibiotics.

Current guidelines on prescribing antibiotics

The government’s campaign to curb the spread of antimicrobial resistance by limiting the use of antibiotics began in 1998. Guidelines were published by the DoH’s Standing Medical Advisory Committee (SMAC) on antimicrobial resistance and the authors stated: ‘The report is aimed at getting doctors and patients to work in partnership to reduce the unnecessary use of antibiotics. Patients do not need antibiotics for colds and flu, and doctors should resist the pressure to prescribe them unnecessarily.’

Practical measures included in the guidelines included:

- Not giving antibiotics for simple coughs and colds;
- Not giving them for most sore throats – they are usually caused by viruses which antibiotics do not treat;
- Shortening courses of treatment when possible;
- Avoiding the prescribing of antibiotics over the phone.

The latest government advice on the prudent use of antibiotics outlines the following action (DoH, 2003):

- Antibiotics will normally be used only after a treatable infection has been recognised or there is a high degree of suspicion of infection;
- The choice of antibiotic will normally be governed by local information about trends in antibiotic resistance or a known sensitivity of the organism;
- Antibiotics will be taken by patients only for the prescribed period at the correct dose;
- The prescribing of antibiotics for children will be carefully considered; they are often unnecessarily prescribed for common viral infections and the child is subsequently more likely to develop a resistant infection;
- Antibiotics will be used for prevention of infection only where benefit has been proven;
- Narrow spectrum antibiotics will be preferred to the broad-spectrum groups.

Conclusion

There will always be a dilemma for prescribers in deciding whether promoting the interests of individual patients outweighs the legitimate public health concerns regarding resistance.

Until more is known about the dangers of prescribing specific antibiotics it is crucial that nurses wait for the results of the study’s findings and the recommendations for any further research.

BOX 1. SOME COMMONLY ENCOUNTERED GROUPS OF ANTIBIOTICS

<table>
<thead>
<tr>
<th>BETA LACTAMS</th>
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<tbody>
<tr>
<td>Penicillins: penicillin, amoxicillin</td>
</tr>
<tr>
<td>Cephalosporins: cefazolin, cefuroxime, cefotaxime</td>
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<tr>
<td>Monobactams: a relatively small group – aztreonam</td>
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<tr>
<td>Carbapenems: meropenem, imipenem</td>
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<table>
<thead>
<tr>
<th>AMINOGLYCOSIDES</th>
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</thead>
<tbody>
<tr>
<td>Gentamicin, amikacin, tobramycin, netilmicin</td>
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<table>
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<tr>
<th>QUINOLONES</th>
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<tbody>
<tr>
<td>Ciprofloxacin, ofloxacin, moxifloxacin</td>
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<table>
<thead>
<tr>
<th>GLYCOPEPETIDES</th>
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<tbody>
<tr>
<td>Vancomycin, teicoplanin</td>
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<table>
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<tr>
<th>MACROLIDES</th>
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</thead>
<tbody>
<tr>
<td>Erythromycin, azithromycin, clarithromycin</td>
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</table>
A study soon to be published in the journal Respiratory Medicine claims that deaths caused by pneumonia have risen since the Department of Health told prescribers in 1998 not to give antibiotics for coughs, colds and sore throats (NT News, 6 January, p9).

These prescribing restrictions were prompted by fear that widespread and sometimes inappropriate use of antibiotics was leading to a growth in drug-resistant micro-organisms and a reduction in the effectiveness of antibiotics in treating infectious disease.

A recent report from England’s chief medical officer focused on the danger of resistance to antibiotics: ‘Indiscriminate and inappropriate use of antibiotics to treat infection within a clinical service promotes the emergence of antibiotic resistant organisms and the “super-bug” strains’ (DoH, 2003).

However, the findings of this latest study highlight the dilemma confronting nurses and doctors – how to continue the appropriate prescription of antibiotics while ensuring that growth of microbial resistance to infectious diseases is kept to a minimum.

**Antibiotics**

Antibiotics had a major impact on health care in the previous century. They meant doctors were able to treat infectious diseases, such as diphtheria, that previously had been fatal.

Alexander Fleming discovered the first antibiotic in 1928 after noticing that the growth of a staphylococcal culture had been inhibited by the presence of a contaminant mould. A substance produced by the mould prevented the growth of some bacteria – this substance was extracted and called penicillin.

However, penicillin was difficult to make in sufficient quantities and it was not until the early 1940s that antibiotics were manufactured on a large scale (Box 1).

Antibiotics work by attacking structures that bacteria possess but human cells do not, for example, the peptidoglycan component of the bacterial cell wall (Hopkins, 1999). They only work against infections such as pneumonia and urinary tract infections caused by bacteria. Antibiotics are not effective against viral infections such as colds and influenza, except occasional cases when they are complicated by a secondary bacterial infection.

**Bacterial infections**

Bacterial infections are caused by the presence and growth of micro-organisms that damage the host’s tissue. The extent of the infection is determined by how many organisms are present and the toxins they release.

Symptoms of bacterial infections include pyrexia, swelling, pain, heat, redness and loss of function. The most important risk factors are burns, severe trauma, low white blood cell counts, patients on immunotherapy treatment and anyone with malnutrition or vitamin deficiency.

**Resistance to antibiotics**

When antibiotics were first discovered they were very effective in the treatment of many bacterial infections. But the ability of antibiotics to cure previously fatal infectious diseases led to them being regarded as ‘miracle drugs’ with powers that exceeded their actual pharmacological properties.

In most European countries antibiotics are the second most widely prescribed drugs after analgesics. Unfortunately, this high level of antibiotic use has serious repercussions. Their excessive use has led to a rapid rise in the prevalence of drug-resistant micro-organisms.

Antibiotic resistance takes place when bacteria mutate in a way that reduces or eliminates the effectiveness of drugs designed to cure infections. Because of this, many older antibiotics have become ineffective or far less reliable than they used to be. To avoid such resistance, new antibiotics with slightly differing chemical properties were developed. These were effective until new resistance emerged and spread to these new drugs, too.

**Methicillin resistant Staphylococcus aureus**

The dangers of overprescribing antibiotics are perfectly illustrated by the so-called hospital ‘superbug’ MRSA. A recent DoH report highlighted MRSA as posing ‘particularly high risks for some patients’ (DoH, 2003) and the UK now has some of the highest rates of MRSA infection in Europe (Duckworth, 2003).

MRSA was first observed in the 1960s and has spread steadily becoming a worldwide phenomenon. The bug is carried by humans in the nose or on the skin and in the

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**REFERENCES**


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