

Medicine for Managers

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Antibiotic resistance

Ask any GP what recurring difficulties they encounter and most will say it is patients who present with a cough or 'flu symptoms and who demand an antibiotic. No matter how much explanation is provided about the actions of antibiotics and their ineffectivity against viruses, they continue to demand one and offer the mantra of "the last time you didn't give me one, I became very much more ill and needed one in the end!"

In 2024, about thirty-four million prescriptions for antibiotic were written in the UK, down by 1.1 million (3.2%) from 2023. Recent estimates suggest that about 20% of all antibiotic prescriptions are inappropriate and examples include:

- **Cough** 41% treated with antibiotic, 10% recommended as necessary
- **Sore Throat** 59% treated with antibiotic, 13% recommended as necessary

Interestingly, data reveals significant regional variations with, for example 30.4 courses of antibiotic per 1,000 patients in Merseyside compared to 22.8 per 1000 patients in the Thames Valley.

Research identified about 67,000 serious antibiotic resistant infections in 2023, most of which were caused by the bacterium *E Coli*

which is responsible for many urinary tract infections, diarrhoea, vomiting and fever.

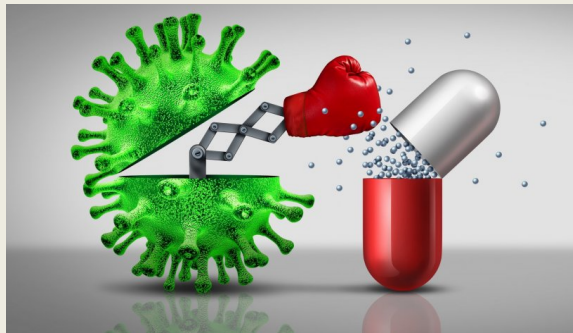
The increasing number of resistant infections will result in squandering of what is an extremely precious resource, resulting in increasing numbers of deaths and will, as one

recent Prime Minister said, "cast us back into the dark ages of medicine" unless action is taken.

The Chief Medical Officer spoke of "apocalyptic scenarios"

It is easy to criticise prescribers for overusing antibiotics but to do so takes no account of the unrelenting and irresistible demands of many patients.

GP explanations about viral infections are met with angry frustrated patients and slammed surgery doors. Such patients often return to the surgery two days later saying that the symptoms



have not gone and “*the doctor always gives me an antibiotic in the end*”.

So, what is antibiotic resistance and why does it matter? It is defined as;

the resistance of a bacterial micro-organism to an antibiotic that was originally effective for treatment of infections caused by it.

The resistance threatens to prevent effective treatment of an increasing range of infections.

Serious infections such as tuberculosis, bacterial pneumonia, urinary infections and septicaemia are becoming increasingly difficult to treat and resistance spreads.

Some gonorrhoea infections, for example, are now resistant to so many antibiotics that the disease threatened to become untreatable.

However, recently new antibiotics against gonorrhoea have fortunately been approved.

The results of resistance to antibiotic therapy are obvious, as formerly standard treatments become ineffective. Thus, such medication fails to assist the body in fighting off the infection, worsening complications and, in the most serious cases, death.

Why do bacteria become resistant to antibiotics?

In essence most resistance occurs simply because bacteria replicate themselves erroneously and a proportion of those mutations resist the bactericidal properties of specific antibiotics. Bacteria that can resist an antibiotic survive selectively following treatment with the antibiotic resulting in selection pressure for the development of resistant strains.

Some bacteria acquire resistance from other bacteria. This may occur by simple mating called ‘conjugation’ where genetic material is transferred between bacteria. Viruses can also transfer genetic material between bacteria that they attack.

That development of resistant strains of bacteria is accelerated the more that a particular antibiotic is used and particularly if it overused or misused.

The problem may be exaggerated in circumstances where hygiene and infection control procedures are poor. Spread of resistant bacteria is fostered by insanitary conditions and poor food handling.

The decline in the effectiveness of antibiotic will have national and international consequences. There will be the potential for a commonly

Antibiotic resistance relates to drugs which attack bacteria. Antimicrobial resistance is a broader term referring to the ability of bacteria, viruses, fungi and parasites to resist the actions of antibiotics, antivirals, antifungals and drugs that fight parasites such as antimalarial drugs.

occurring bacterium, which is easily spread through, for example, coughing or sneezing, to infect patients in their hundreds of thousands or millions with little treatment to protect them.

Only supportive measures will be able to be offered. It is likely that, in such a scenario, it may be that the young, the old and the infirm are most vulnerable to infection, complications and death.

Morbidity (long-term, non-fatal consequences of infection) is likely to be much higher and such outcomes will have serious consequences for health care expenditure.

Furthermore, such resistant bacteria will compromise so many other treatments that are taken for granted;

- heart surgery,
- cancer therapy,
- transplant surgery and treatment for immuno-compromised people such as with HIV.

The whole problem of antibiotic resistance is also compromised by the widespread use of antibiotics in animal husbandry and the considerably more lax pharmaceutical regulation in some parts of the world where antibiotics can be purchased over the counter.

To prevent the apocalypse which has been forecast there will need to be concerted action

across the globe to reduce inappropriate antibiotic usage.

Such drugs should be prescribed only by an appropriately qualified healthcare professional. When antibiotic courses are taken it is **essential that the whole course is completed**. Wherever possible antibiotics should be selected on the basis of proven bacterial sensitivity rather than empirically (that is simply guessing which antibiotic is *likely* to work).

If antibiotic usage is not used carefully and with

discrimination, the risk will be that infections may become increasingly difficult to treat or even impossible in some circumstances.

Particular groups of patients may be particularly vulnerable in such circumstances:

- Those over 75
- Babies less than 72 hours old with bacterial infection
- Patients with heart failure
- Diabetic patients
- Patients with weakened immune systems, including those with HIV and those undergoing chemotherapy.

Alexander Fleming, who expressed caution about antibiotic usage, warned that “**one sometimes finds what one is not looking for**”.

Perhaps the importance of such drugs is well encapsulated in a quote from **David Bowie**: “**I don’t expect the human race to progress in too many areas. However, having a child with an**



ear infection, makes one hugely grateful for antibiotics”.

New antibiotics are still being discovered although more slowly than in the past. There are promising new agents but there is a paucity because:

- Overall costs of creation and bringing to market are high
- Discovery and testing can take ten years or more
- Bacteria become resistant quickly
- Antibiotics are only short courses therefore attracting less income for Drug Companies

However, despite any difficulties:

- a. Antibiotics are being discovered and introduced, although it is slow
- b. AI-designed drugs to combat resistance and introduce novel therapies are being designed.

There will be increasing global collaboration for the next generation which will go a long way to ensure effective eradication of infections for years to come.

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