

# RESISTANCE TO ANTIMICROBIALS

– an increasing problem in our community

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Resistance to antimicrobials has provided continuing challenges in the treatment of infections since the first agents were used more than 70 years ago. Most antimicrobials are based on molecules that are produced by one organism to kill or inhibit the growth of other microorganisms. The organism producing the natural antimicrobial substance must also have a mechanism to avoid being killed or damaged itself. Resistance to antimicrobial agents can occur when the genes that are responsible for the “defence mechanism” in the original organism are transferred to other organisms, thus also rendering them resistant. Unfortunately this process has led to increasing resistance to most new antimicrobial agents within years of their introduction.

For many years the pharmaceutical industry has managed to stay ahead of the game by continually developing new antimicrobials. However, fewer new agents are now being developed, largely due to economic reasons – the short-term nature of an antibiotic course does not provide the returns associated with long-term medicines, and resistance means that the antimicrobial becomes obsolete within a short time period. Late in 2009, the Infectious Disease Society of America called for a worldwide commitment to achieve the development of ten new antibiotics within the next ten years (the 10 x 20 initiative). The World Health Organisation (WHO) has identified antimicrobial resistance as “one of the three greatest threats to human health”. We may well be



*The era of antibiotics is coming to a close. In just a couple of generations, what once appeared to be miracle medicines have been beaten into ineffectiveness by the bacteria they were designed to knock out. Once, scientists hailed the end of infectious diseases. Now, the post-antibiotic apocalypse is within sight. – Sarah Boseley, The Guardian, UK.*

entering an age where, once again, it is not possible to successfully treat a range of infections caused by common bacterial pathogens.

In the past, antimicrobial resistance was largely limited to infections acquired in hospitals, but in recent years it has increasingly become a problem with infections acquired in the community, leading to the emergence of multiple drug resistant organisms. The WHO has recommended several interventions to reduce the spread of these organisms.

These interventions include educating people about:

- Basic hygiene measures to help prevent infection
- The need for rational use of antimicrobials
- The problems posed by antimicrobial resistant bacteria

Healthcare professionals should also be educated about resistant organisms, infection control and the benefits of restricting antimicrobial use to those who have definite indications for treatment.

#### **Understanding the threat of multiple drug resistant organisms in New Zealand**

From overseas surveillance studies it is apparent that many of the multiple drug resistant organisms are clonal i.e. have the same origin, and have been able to spread widely. As an example, most methicillin resistant *Staphylococcus aureus* (MRSA) isolates in New Zealand have originated from overseas. Extended spectrum beta lactamase (ESBL) producing *Klebsiella pneumoniae* was first recognised in Hawke's Bay and has now spread around the country – Hawke's Bay still had a high rate of this organism in surveillance performed in 2008. Many of these organisms have become widespread in the community as well as causing infections in healthcare settings.

The major factor responsible for this resistance problem is the misuse of antimicrobials, which includes inappropriate prescribing by healthcare professionals (wrong choice of agent, prescribing when an antimicrobial is not indicated,

inappropriate dose or duration of therapy) and lack of compliance by patients. Microbiologists have been talking for years about widespread resistance potentially occurring, but the reality is that it is happening now.

It is essential for everybody to contribute to the efforts to prevent antimicrobial resistance. Widespread emergence of multiple drug resistant organisms will impact on all healthcare sectors, leading to increasing morbidity and mortality, due to the difficulty of treating increasingly resistant bacteria.

What strategies could work? There needs to be a greater focus on educating the general public about increasing antimicrobial resistance and the fact that viral infections do not respond to antimicrobial treatment. There have been some programmes that have focused on these issues already e.g. PHARMAC's "Kick that Bug" Wise Use of Antibiotics campaign, but the messages need to be continually promoted, in a variety of changing ways to keep the issue in the forefront of everybody's mind.

The current situation of antimicrobial resistance in New Zealand could be used to strengthen the message and illustrate the consequences of antimicrobial misuse. To

do this, comprehensive data are required. Surveillance is presently carried out through Environmental Science and Research (ESR) and is published on its website ([www.esr.cri.nz](http://www.esr.cri.nz)). However this is national data and does not reflect the situation in some smaller centres, which may have clones of resistant bacteria, but the numbers are too small nationally to raise awareness. The spread of the ESBL producing *Klebsiella pneumoniae* from the Hawke's Bay is a good example of this.

Local information needs to be collected and analysed so that each area can determine what specific issues need to be addressed. For example, in South Canterbury a multidrug resistant *E.coli* has become more prevalent over the last two years. This area has the highest quinolone use in New Zealand, leading to antimicrobial resistance, and strategies are currently being developed to reduce this. In Christchurch, "MRSA USA 300" has emerged in at least a couple of residential care facilities, and without intervention will spread widely including into acute care hospitals.

Regional information needs to be used to inform healthcare professionals about the issues through local meetings and workshops. Resources, such as patient information



pamphlets, are required to assist in reducing unnecessary prescriptions. Targeted interventions can be developed to reduce the prescription of specific antimicrobials, which appear to be increasing local resistance.

Antimicrobial resistance in the community is becoming an increasing problem. Interventions must be implemented on a large scale to be successful and unfortunately this is not a simple process. The solutions for many of the issues of resistance also remain unclear. However, this is not a reason to ignore the problem and failure to respond effectively will only increase the prevalence of these potentially incurable infections in our communities.

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*This article is the first in a series devoted to understanding and addressing the problem of antimicrobial resistance in New Zealand. Subsequent articles will cover appropriate and rational use of antimicrobial agents, strategies to minimise the problem of resistance and an overview of antimicrobial use and resistance in New Zealand.*

*We challenge you to examine the use of antimicrobials in your practice and to consider ways in which you may contribute to reducing resistance in our communities.*

*Prescribers, please complete the accompanying questionnaire about antimicrobial use in primary care. This is also available online at: [www.bpac.org.nz](http://www.bpac.org.nz)*



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