

SUPERBUGS 101

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THE RISE AND RISE OF SUPERBUGS

Superbugs, known more technically as antimicrobial resistance, refer to microorganisms (like bacteria strains or viruses) which have developed resistance to antimicrobial drugs (like antibiotics or antivirals).

At least 700,000 people die each year from superbugs, and that number is predicted to rise to 10 million by 2050.[1] The World Health Organisation (“WHO”) has declared superbugs a world health crisis, and the Australian Government calls it one of the biggest threats to human and animal health today.

If antibiotics (and other antimicrobial drugs) are no longer effective, we could see a return to the pre-antibiotics era where common infections are fatal and everyday elective procedures like hip replacements are not worth the risk of infection. Chemotherapy treatment (which in itself lowers the body’s immune system) would be compromised and treating resistant infections will become increasingly expensive with poorer patient outcomes.

Resistance is developing quickly, and new drugs are not keeping up largely thanks to the overuse and misuse of antimicrobial drugs.

Interestingly, the agricultural industry is a leading cause of the crisis - livestock consume the majority of global antibiotics in order to enhance growth and prevent infection.

Australia is not immune, having one of the highest rates of antibiotics use in the world.[2] Antibiotics are prescribed here for acute respiratory tract infections at rates four to nine times higher than those recommended by the therapeutic guidelines.[3]

FAMOUS AND DANGEROUS SUPERBUGS

- Tuberculosis, once thought to be largely eradicated in first world countries, has reappeared especially in large cities with transient populations such as London. WHO estimates that in 2016 there were 490,000 new cases of multi-drug resistant tuberculosis.
- Drug resistance in HIV has been detected. In 2010, an estimated 7% of people starting antiretroviral therapy in developing countries had drug-resistant HIV. In developed countries, the same figure was 10-20%.[4]
- Enterobacteriaceae bacteria which live in the bowel are becoming resistant to powerful antibiotics called Carbapenems. When these resistant bacteria cause infection outside of the bowel, they cause conditions like urinary tract infection, wound infection and pneumonia.
- According to the WHO, treatment failure for gonorrhoea has been confirmed in at least 10

countries including Australia.[5]

- Infections caused by golden staph (staphylococcus aureus) are commonly resistant to first line defence drugs. Patients with MRSA (methicillin-resistant staphylococcus aureus) are estimated to be 64% more likely to die than people with a non-resistant form of the infection.[6]

CAN WE FIX IT?

Combatting the crisis requires a global coordinated approach tackling these areas:

1. Slowing the spread of resistance. Prescribing antimicrobial drugs in fewer cases or prescribing a narrow spectrum, ensuring courses are finished and by reserving treatment for serious cases. A lot of this would come down to education – both for the patient and the practitioner.
2. Research and development. New antibiotics need to be developed at a faster rate to stay ahead of superbugs. An issue here is that the benefits from pharmaceuticals can take decades to pay off. Creating new antibiotics may not be worth it if they become resistance before the breakeven point.

New antibiotics are still being found, with a new class of antibiotics, called malacidins, being found in soil samples by researchers at The Rockefeller University in New York.[7]

Researchers are trying to stay one step ahead of superbugs. For instance, The Institute for Molecular Bioscience at The University of Queensland is looking at developing more potent versions of antibiotics as well as targeting the immune system as an alternate approach to fight infections.[8]

3. Reduce the spread of infections. Enhancing public health (through vaccinations and personal hygiene) and ensuring healthcare settings adhere to infection prevention and control protocol.

Check out the [Commonwealth Governments fact sheets](#) for more information for all sectors – agricultural, GP's, hospital, animal owners and the general public.

CRYSTAL GAZING THE MEDICO LEGAL FUTURE

Consequences of the superbug crisis on medical and health law may include:

- Changes to prescribing guidelines and claims of over or improper prescribing by patients who develop resistance.
- Health care providers will need to prioritise and look at further ways to reduce the risk of infection and its spread. For instance, immuno-compromised patients may need to be treated outside of a hospital setting where infections are more likely.
- Prescribers will need to keep updated about resistant strains in the community and treated accordingly.

Be warned: I am a lawyer, not a scientist. This article is based on my research of the topic and my opinion, and definitely not deep scientific analysis!

[1] The Review on Antimicrobial Resistance, December 2014, https://amr-review.org/sites/default/files/AMR%20Review%20Paper%20-%20Tackling%20a%20crisis%20for%20the%20health%20and%20wealth%20of%20nations_1.pdf.

[2] Australia is the 8th highest user of antibiotics out of 28 European countries and is more than double that of several North European countries.

[3] Medical Journal Australia, 17 July 2017, Antibiotics for acute respiratory infections in general practice: comparison of prescribe rates with guideline recommendations, <https://www.mja.com.au/journal/2017/207/2/antibiotics-acute-respiratory-infections-general-practice-comparison-prescribing>

[4] <http://www.who.int/mediacentre/factsheets/fs194/en/>.

[5] <http://www.who.int/mediacentre/factsheets/fs194/en/>.

[6] <http://www.who.int/mediacentre/news/releases/2014/amr-report/en/>.

[7] <https://directorsblog.nih.gov/2018/02/20/powerful-antibiotics-found-in-dirt/>.

[8] <https://imb.uq.edu.au/article/2017/11/how-scientists-plan-beating-superbugs-no-antibiotics-required>.

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