The World Health Organization has declared antibiotic resistance one of the most pressing challenges to global health today. If we don't act, by 2050, drug resistant diseases could be killing more people than cancer, and cost the world economy more than its current size. *Southampton Connects* finds out how University researchers are working to fight back.

A problem as old as time

Antibiotic resistance isn't new. When you use antibiotics, bugs develop resistance to them, that's just a fact of life. But misuse of antibiotics in humans and in the food industry is accelerating the process to a point where these life-saving drugs might be rendered useless.

According to Michael Moore, Professor of Primary Health Care Research, around three quarters of antibiotics used in people in the UK are prescribed by GPs. And most are for respiratory infections. Yet antibiotics achieve, on average, just a 12-hour reduction in symptom duration for a sore throat, in an illness that usually lasts eight to 10 days, and a day or so for a chesty cough – an illness that lasts about three weeks.

Although antibiotics may lower the risk of complications, these are rare and for most, the benefit simply doesn't outweigh the risk of resistance. Yet we're paving the way for routine operations to become much more hazardous, and for what were once easily-treated infections to become deadly.

Dame Sally Davies (Chief Medical Officer for England) talking to Professor Moore at the NAMRIP launch last year.

Fighting back

To tackle antibiotic misuse in people, Michael is focusing on giving GPs tools to avoid prescribing them, and his work is informing healthcare policy. His group has pioneered the 'just in case' prescription, which is now part of NICE guidance. This works on the principle that simple infections (like a sore throat or chest infection) are likely to get better on their own. Instead of taking antibiotics immediately, patients are given a prescription to use if they don't get better without prescription medication.

Michael explains: "Our trials have shown that if you use that approach, only around 40 per cent of people will collect their prescription so you avoid the other 60 per cent using an antibiotic who didn't need one."

Michael is now researching other ways to help with simple infections. He's just finished a trial in women with cystitis, investigating a traditional herbal medicine called *Uva ursi* that is thought to ease symptoms. And he's about to trial another herbal medicine called *Pelargonium*, in patients with chest infections. Both studies are being funded by the National Institute for Health Research School for Primary Care Research.

Michael comments: "There's reasonable evidence that these herbal medicines, which would have been used for hundreds of years before antibiotics were introduced, can relieve symptoms. And since antibiotics don't relieve symptoms well, perhaps people will be happier to wait a few days while their bodies fight off infection."

Michael's team was one of 12 groups who contributed exhibition displays at the launch conference of the Network for AntiMicrobial Resistance and Infection Prevention (NAMRIP) last year. NAMRIP was founded by Tim Leighton, Professor of Ultrasonics and Underwater Acoustics, and began as a University Strategic Research Group in 2015, but now has expanded internationally. This initiative brings together over 200 researchers from disciplines across the University and local hospitals, and has members across universities and industries worldwide. All with the aim of tackling antimicrobial resistance and infection prevention.

Tim comments: "One area NAMRIP looks at is new antibiotics, but by far most of our work is concerned with preparing for a world without antibiotics. I don't see any way of avoiding a world where antibiotic use is unavailable for most of the things we use it for today, so we are preparing for that."

Just one example of NAMRIP research is rapid diagnosis techniques to quickly pin down exactly what type of infection people have, which can avoid broad spectrum antibiotic use, or any use at all if a virus or fungi is identified. Another innovation is a phone app developed for doctors by Dr Kiernan Hand called the MicroGuide. Doctors enter a patient's symptoms and the app tells them the best, or most likely, treatment they should prescribe. And Tim's personal research focuses on improving hand cleaning.

Tim explains: "We should all wash our hands for 20 seconds in warm soapy water to kill bacteria but people don't – the average in the UK is six seconds, often in cold water without soap. It doesn't matter how much advertising or training you put in, you can't get people to wash their hands properly. So if you can't change behaviour, I decided to change the water and make six seconds of cleaning with cold water without soap as effective as the desired 20 seconds of warm soapy water. We found that by sending sound waves through water, it can clean our hands wonderfully well.

"*If we clean our hands well, our chances of passing infections from one-to-another goes down. And you prevent the infection entering the body. Therefore if the infection never enters the body, you never need to use an antibiotic, so suddenly we have come up with a measure that scores on two levels*."

Critically, Tim is working to not just publish good research in journals, but to ensure it gets into the hands of people who can make a viable business out of it so it makes an impact on the world, and fast. This is part of the core Philosophy of NAMRIP.

"If we don't do that then we're moving too slowly and the antimicrobial resistance will outpace us. The human race will survive antibiotic resistance. But by 2050 we won't have the luxurious level of healthcare that we have now. We need to put at least as much money into preparing for a world in which there aren't any antibiotics as we do for chasing that elusive new antibiotic because that will extend the lifetime of whatever new antibiotic we might come up with."

NAMRIP recently co-hosted the first ever meeting to discuss how the retail food and supply chain sector can tackle the growing problem of antimicrobial resistance (AMR). Jointly hosted by the Food Standards Agency, the meeting brought together a wide-ranging group of over 100 participants from the retail sector, Government, charities and research organisations.

Tim adds: "Many people think of the rise of 'superbugs' as a healthcare issue, but it will also seriously affect our ability to produce food on the scale, and for the prices, we take for granted today. It will become a major threat to food security in the near future and it will not be eliminated from the world, and the question is, how we mitigate its affects, and invest to maximize those mitigations."

Join the fight against antibiotic resistance

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