Why is antibiotic resistance on the rise?

Accelerating resistance
The time between drug availability and resistance development is decreasing. This is a global problem, mostly due to incorrect antibiotic usage in both humans and animals.1–3

Shrinking treatment options
Resistance has now been observed against nearly all known antibiotics. We are becoming increasingly reliant on a shrinking antibiotic pool, which in turn is fuelling antibiotic resistance and driving a vicious circle.1,2
Some bacterial strains are now resistant to many or all antibiotics. Depending on the degree of resistance, these may be known as multidrug resistant (MDR), extensively drug resistant or pan-drug resistant.1,2

The dwindling pipeline
The number of new antibiotics coming through the pipeline is drying up, due to economic and regulatory hurdles.1

Adapted from Ventola 2015.1
Later-line antibiotics are often used as the last resort because they can be more toxic to the patient, and more costly to the healthcare system:²

**Tetracyclines and glycylcyclines**

Used for serious Gram-negative infections. Glycylcyclines in particular are often used for MDR strains.² At high doses they can cause kidney damage and alter bone marrow function over long periods of time, and cannot be used in children or pregnant women.⁴

Resistance has emerged but is still uncommon.²

**Carbapenems**

Another type of β-lactam and the only option in this class when cephalosporin resistance first emerged in healthcare settings, but is now spreading into the community.²

Cephalosporin resistance first emerged in healthcare settings, but is now spreading into the community.²

**Polymixins**

Developed several decades ago, polymixins have been little used because they can be toxic to the kidneys and nerves.²,³ Their use has recently increased due to a need for additional treatments for MDR Gram-negative infections, but they remain the final option because of their toxicity.²,³

Resistance has emerged, but is still uncommon.²,³

This is a small antibiotic portfolio with which to fight an escalating resistance problem. Worryingly, last-resort antibiotic use has increased: Globally, between 2000 and 2010 we used 13% more polymixins.⁵

The ability to fight infection with antibiotics is critical for medical advances such as joint replacements, organ transplants and cancer therapy.² A combination of new antibiotics and their correct usage is needed to relieve the pressure on our remaining treatment options and curtail growing resistance.²,³,⁶

References