



ANTIMICROBIAL RESISTANCE

**ONE OF THE TEN THREATS TO GLOBAL HEALTH 2019
ACCORDING TO THE WORLD HEALTH ORGANIZATION (WHO)**

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The emergence of ‘superbugs’ such as Methicillin-resistant *Staphylococcus aureus* (MRSA) is attributable to this.

Antibiotics only work against bacteria and should not be used to treat viral infections.

WHAT IS ANTIMICROBIAL RESISTANCE?

Antimicrobial resistance (AMR) is a global health threat affecting an increasing number of people, regardless of wealth, status or gender. AMR is listed as one of the ‘Ten Threats to Global Health 2019’ according to the World Health Organization (WHO) (WHO, 2019).

AMR occurs when antimicrobial drugs used to treat pathogenic infections no longer work against those pathogens. Antibiotics are an example of antimicrobial drugs which are used to treat bacterial infections. Antibiotic-resistant bacteria are no longer affected by the action of antibiotics and can survive in their presence.

Due to antibiotic resistance, certain antibiotics no longer work against bacterial infections. Last-resort drugs are required in these cases, many of which have side effects. Instances where the last resort medications are no longer effective and no other treatment is available have been observed (WHO, 2018). The European Centre for Disease Prevention and Control (ECDC) estimates that each year 33,000 people die in Europe due to infections with antibiotic-resistant bacteria. The ECDC study found that 39% of the burden is caused by infections with bacteria resistant to last-resort antibiotics such as carbapenems and colistin (Cassini et al., 2019).

Medical procedures such as surgery, chemotherapy or caesarean section rely on antibiotics to prevent infections (WHO, 2018). When these antibiotics no longer work, these common medical procedures will once again become life-threatening.

WHAT CAUSES ANTIMICROBIAL RESISTANCE?

Organisms such as bacteria naturally develop resistance to antimicrobials through mutations. Mutations occur naturally and are essential to the process of evolution. However, due to incorrect use of antimicrobials, mutations giving rise to antimicrobial resistance arise at a much faster rate (NIAID, 2011; Prestinatti et al., 2015).

AMR development is accelerated when antimicrobial drugs, such as antibiotics, are overused and misused. The emergence of ‘superbugs’ such as Methicillin-resistant *Staphylococcus aureus* (MRSA) is attributable to this. Acquiring resistance to antimicrobials allows the microorganisms to survive and spread.

Antimicrobial-resistance has become a serious health threat due to the overuse and misuse of antimicrobial drugs and poor infection control in both the human and animal healthcare system and the agricultural sector (Huttner et al., 2013). Antibiotics are often over-prescribed and used to treat common colds and flus. Viruses are responsible for common colds and flus, not bacteria. Antibiotics only work against bacteria and should not be used to treat viral infections. Antibiotics are often misused when the course of antibiotic prescribed by the doctor is stopped prematurely (CDC, 2017). Lack of awareness of AMR can compromise antibiotic prescribing.

Antibiotics are overused in many farming practices. While the European Union (EU) banned the use of antibiotics for non-therapeutic reasons in livestock, other countries and particularly the USA, still use antibiotics as preventative measures and to promote growth (Huttner et al., 2013).

It is the overexposure to the antibiotics that increases the rate of mutation in microorganisms leading to the development of resistance and spread of AMR pathogens.

Poor hygiene and poor infection prevention are important contributors to the spread of antimicrobial resistant pathogens and increase the prevalence of infections. Lack of awareness contributes to poor infection control.



Globally, 700,000 people are estimated to die each year from infections with antimicrobial resistant organisms.



The number of deaths attributable to infections with antimicrobial resistant pathogens will rise to 10 million worldwide. According to the projection, that's almost two million deaths more than those that will be attributable to cancer.



WHY IS ANTIMICROBIAL RESISTANCE A GLOBAL HEALTH THREAT?

There has been a global rise in antibiotic resistant bacteria. Globally, 700,000 people are estimated to die each year from infections with antimicrobial resistant organisms (HM Government, 2019).

A UK report from 2016 commissioned by the Prime Minister and the Wellcome Trust projected that, without global action, the number of deaths attributable to infections with antimicrobial resistant pathogens will rise to 10 million worldwide. According to the projection, that's almost two million deaths more than those that will be attributable to cancer (HM Government and Wellcome Trust, 2016).

An increasing number of pathogens are resistant to one or more antimicrobial drugs. As a result, some common infections are extremely difficult and, in certain cases, almost impossible to treat.

Pneumonia is no longer readily treatable with penicillin and more frequently requires second- and third-line antibiotics (Prestinaci et al., 2015).

Gonorrhoea is a sexually transmitted bacterial infection which soon could be untreatable. Treatment failure with the last-resort antibiotic against gonorrhoea has occurred in at least ten countries, including Australia, France and the UK (WHO, 2018).

The number of deaths attributable to infections with *Klebsiella pneumoniae* resistant to carbapenems increased six-fold in only 10 years, from 2005 to 2015 (ECDC, 2018). Very few options remain to treat carbapenem-resistant *K. pneumoniae* infections. The last resort drug, a toxic antibiotic colistin, have been shown to fail to treat carbapenem-resistant *K. pneumoniae* (Prestinaci et al., 2015). In October 2019, German health authorities reported an outbreak of extensively drug-resistant (XDR) *K. pneumoniae*, resistant to carbapenems and colistin (ECDC, 2019).

Antimicrobial resistance is a real threat to all of us. If we run out of possible treatments, we will enter a post-antibiotic era, where infectious diseases will no longer be treatable.

CONSEQUENCES OF ANTIMICROBIAL RESISTANCE

Antimicrobial-resistance is a huge burden to the economy. Patients infected with resistant bacterial strains stay longer in hospitals and require more expensive treatments. Thorpe et al. (2018) found that antibiotic resistance added \$1,383 to the cost of treating a bacterial infection in the US. In Europe, the overall economic burden of antibiotic resistance in 2007 was estimated to be at least 1.5 billion euros (ECDC and EMEA, 2009).

Antimicrobial resistant infections are responsible for more deaths than infections caused by organisms susceptible to antibiotics (Septimus, 2018). According to WHO, people infected with MRSA are 64% more likely to die compared to those infected with non-resistant *Staphylococcus aureus* (WHO, 2018).

CAN WE TACKLE AMR?

Health organisations and government agencies such as WHO and the UK government are urging healthcare professionals to raise the public's awareness, limit the usage of antibiotics and improve infection prevention and control.

Infection prevention is an essential part in tackling AMR. Preventing the spread of pathogens including those that are resistant to antimicrobials reduces the chances of infection and helps protect lives, especially of those who are immunocompromised and vulnerable to infections.

Preventing infectious diseases through appropriate infection prevention measures reduces the usage of antimicrobial drugs lowering antimicrobial resistance (Septimus, 2018).



Studies show that infection prevention can reduce the number of infections with antimicrobial-resistant pathogens.



It is crucial that hospital surfaces are cleaned and disinfected regularly with a non-fixating disinfectant to prevent the spread of antimicrobial-resistant organisms and to avoid biofilm formation within which organisms, including those that are resistant to antimicrobials, can accumulate.



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