



An Introduction to MDR-TB

What is antimicrobial resistance?

- Antimicrobial resistance (AMR) is a process in which microbes, including bacteria, evolve to be able to resist the action of drugs, making drugs ineffective. These next generations are then resistant to the drugs designed to kill them, lowering the effectiveness of medicines such as antibiotics used to treat TB.
- There are currently multiple terms used to describe the same issue. As well as AMR, these include 'drug-resistant infections', 'multi-drug resistant', 'superbugs', and 'antibiotic resistance'.

AMR Challenges

- 01 Challenges modern medicine:** Drug-resistant infections are a cross-cutting threat across all of medicine, which undermines treatments that we have come to rely on. Since the 1940's antimicrobials have allowed us to routinely survive operations as well as endure cancer treatments, common illnesses such as diarrhoea, minor injuries from accidents, and survive infections diseases such as TB and malaria. As more drugs stop working, common infections and injuries that were once curable risk becoming more dangerous and killing us once again.
- 02 Research and development:** Despite antimicrobials under-pinning many medical procedures, investment into research of new tools is limited. For some diseases, a new drug brought to market is likely to have its use restricted and limited to cases of last resort, due to the rapidness of the development of resistance to new antibiotics. This offers a limited return on investment to drug developers and, coupled with the high risk of drug development, results in low investment into antimicrobial research and development (R&D). Vaccines offer unique advantages and already play a critical role in reducing AMR. Vaccines play a role by reducing disease burden as well as reducing antimicrobial usage and therefore selection pressure on pathogens.
- 03 Historical lack of political attention:** There has been a historical lack of political attention and global action on AMR. However, recent years have seen a High Level Meeting on AMR in 2016, during which member states unanimously passed a resolution to tackle drug resistant infections, calling for an international response. The G20 has seen AMR on the agenda since 2015 and a group of global organisations and experts were tasked with reporting to the UN Secretary General in 2019.
- 04 One Health:** Addressing the rising threat of antimicrobial resistance (AMR) requires a holistic and multisectoral approach – referred to as One Health – because antimicrobials used to treat various infectious diseases in animals may be the same or similar to those used for humans. Resistant bacteria arising in humans, animals or the environment may spread from one to the other, and from one country to another. AMR does not recognize geographic or human–animal borders.¹

¹ <http://www.euro.who.int/en/health-topics/disease-prevention/antimicrobial-resistance/policy/one-health>



What is MDR-TB?

- TB bacteria have certain attributes which make them more likely to develop resistance to antibiotics. TB is caused by a hardy organism which possesses an unusually thick, waxy cell wall and has the ability to survive in multiple locations in the body, thus the difficulty and length of the standard TB treatment. This complexity is one of the major reasons MDR TB has developed.
- There are two ways that people develop multidrug resistant TB (MDR-TB). Firstly, people get acquired drug resistant TB when their TB treatment is inadequate. Secondly, transmitted drug resistance results from the direct transmission of drug resistant TB from one person to another. It was believed that most drug resistant TB cases arose from acquired TB, however, recent research has found that primary resistance plays a much greater role than previously thought with some estimates of up to 80% of MDR-TB being primarily transmitted.²
- Strains of TB resistant to one or more drugs have been found in every country of the world. The countries with the largest numbers of drug resistant TB cases are India, China and the Russian Federation - which together account for half of the global cases.
- It's important to note that MDR-TB can be cured. However, the treatment cost for treating someone with MDR-TB is much higher, takes a lot longer and has a higher mortality rate compared to drug sensitive TB.
- Cases of extremely drug resistant TB (XDR-TB), to which even the treatment for MDR-TB is not effective, are also becoming more prevalent, often leaving people without any further treatment options.

MDR-TB Challenges

- 01 Global scale:** Tuberculosis (TB) is the world's only major airborne drug-resistant epidemic. 484,000 people were affected by multi-drug resistant TB (MDR-TB) in 2018, ultimately causing almost one-third of all total AMR deaths.³ The threat posed by MDR-TB is significant and the economic impacts catastrophic. By 2050, it is estimated that AMR will be responsible for 10 million deaths every year, with a quarter of those from MDR-TB. This means an estimated 75 million people dying from MDR-TB over the next 35 years, or one person every 12 seconds.
- 02 Difficult to treat:** Treatment is too long and requires expensive and toxic drugs. New treatments have shortened the drug regimen and improved results, but many countries are still using injectable drugs. In most places, completing such a treatment is challenging. The latest treatment outcome data for people with MDR-TB shows a global treatment success rate of 56%
- 03 Global treatment gap:** Despite some progress in testing, detection and treatment, in 2018 only 1 in 3 people with MDR-TB enrolled in treatment. 10 countries accounted for 75% of the global treatment gap, meaning these countries will have a strong influence on progress in closing the gap. Those 10 countries were China, India, Indonesia, Mozambique, Myanmar, Nigeria, Pakistan, the Philippines, the Russian Federation and Viet Nam. China and India alone accounted for 43% of the global gap.

² <http://www.cidrap.umn.edu/news-perspective/2017/03/report-warns-rise-drug-resistant-tuberculosis>

³ https://8eef0112-fcd1-4321-a0d6-0808b310fd35.filesusr.com/ugd/309c93_56d4ef0e87d24667b1d3edae55f6eeb5.pdf