

Is antimicrobial resistance the next big problem for dentistry?

If the ever-growing global issue of antimicrobial resistance is unchecked, it is expected that within thirty years more people will die from resistant infections than will die from cancer. The answer to this complex problem will be less straight forward than simply a vaccine.



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Twenty-twenty will be remembered as the year in which a deadly virus spread globally and rapidly caused over a million deaths, significant damage to national economies and devastating effects on those in lower socio-economic communities. Normal life came to a standstill for people across the world. At the time of writing, the early vaccination programmes for Covid-19 are underway; there is light at the end of this currently dark tunnel. Over time, economies will recover, our lives will go back to a new sort of normal and the annual rate of deaths and morbidity from Covid-19 will stabilise.

This is in sharp contrast to the anticipated impact of drug-resistant infections, where microbes (bacteria, fungi and viruses) are becoming resistant to the full range of antimicrobials. If the ever-growing global issue of antimicrobial resistance is unchecked, it is expected that within thirty years more people will die from resistant infections than will die from cancer (Fig. 1). The answer to this complex problem will be less straight forward than simply a vaccine.

Antimicrobial resistance is such a threat to public health

that it has been compared to the risk posed by climate change and global terrorism. Antibiotics underpin modern medicine and surgery, allowing complex and necessary procedures such as cancer treatments and organ transplants. With little prospect of new classes of drugs on the horizon, a post-antimicrobial era is anticipated in which effective antimicrobials are no longer available. Antimicrobial resistance is a universal issue that could affect anyone. Everyone is vulnerable.

Resistance is driven by the overuse of antimicrobials in both people and animals (including for food production) as well as in the environment (Fig. 2). Exposing people to antimicrobial drugs when not necessary (e.g. 'just in case' or to meet patient demands) increases the risk that they will fail for that person when they are necessary (e.g. to treat sepsis).

Antimicrobial resistance is a slow-motion pandemic, where the pace and range of infections that do not respond to antibiotics increases year on year. The WHO Global Action Plan on antimicrobial resistance aims "to

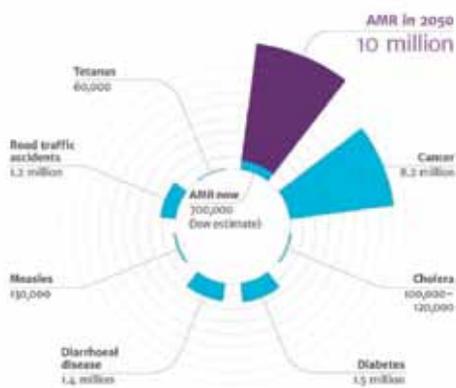


Fig. 1. Deaths attributed to antimicrobial resistance (AMR) in 2016 and 2050, compared to other major causes of death in 2016. Re-printed with permission of the O'Neill Review on Antimicrobial Resistance.

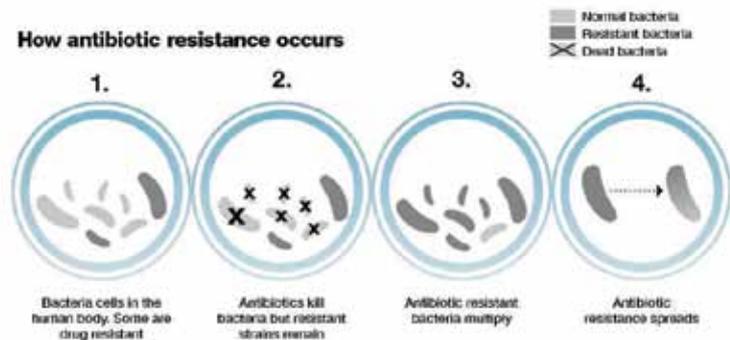


Fig. 2. How bacteria become resistant to antibacterial (antibiotic) drugs. Reproduced with permission of Public Health England (PHE).

ensure, for as long as possible, continuity of the ability to treat and prevent infectious diseases with effective and safe medicines that are quality-assured, used in a responsible way, and accessible to all who need them."

Problem for dentistry

Dentists are responsible for about 10% of antibacterial (antibiotic) prescribing for humans globally. Despite efforts to reduce antibiotic use, too many antibiotics are still being prescribed by dentists: studies in the United Kingdom and United States have found around 80% unnecessary or inappropriate dental antibiotic prescribing. The dental profession has a clear responsibility to commit and contribute to global, national and local efforts to safeguard the effectiveness of antibiotics for future generations.

The failure of antibiotics to treat an oral infection can pose a life-threatening risk. The spread of dental infections toward vital structures in the head and neck may occur rapidly. Yet dental infections are generally amenable to treatment by a dental procedure (such as extraction of the tooth) to remove the source of the infection without the need for antibiotics. For pain in the absence of infection (such as irreversible pulpitis), antibiotics are never appropriate. Dentists are surgeons, skilled and equipped to diagnose and provide definitive treatment for acute dental conditions. Remote management (where patients are not seen face to face) or care provided in non-dental settings (such as the emergency department) are not usually the most effective or safest solutions for patients as dental procedures may not be provided.

In addition to antibiotic resistance, other adverse reactions such as allergy/anaphylaxis and *Clostridoides difficile* (*C. difficile*) infections caused by dental antibiotics are important patient safety risks which can be life threatening. The potential benefits of using antibiotics must, therefore, be balanced against the risk of adverse outcomes.

Best practice

No one-size-fits-all solution exists for tackling antibiotic resistance. Patterns of antibiotic resistance differ between countries (Fig. 3) and a range of other issues (including access to dental care) influence what constitutes appropriate dental antibiotic prescribing. Factors important in some low-middle-income countries, such as the widespread availability of substandard antibiotics for people to purchase in local shops, may be less relevant in some high-income countries. Addressing antibiotic resistance requires tailor-made solutions crafted for the local context.

Patterns of resistance for other combinations can be found at <https://resistancemap.cddep.org/AntibioticResistance.php>.

The FDI World Dental Federation has published a white paper which provides a framework for dental teams to develop local solutions by:

- preventing dental infections,
- optimising antibiotic prescribing (stewardship) and
- raising awareness about antibiotic resistance.

Accompanying the white paper is an online library of resources from around the world that provides examples of material that may be adopted/adapted to meet local needs.

Preventing infections

Preventing infections reduces the need for antibiotics and makes an important contribution to combatting antibiotic resistance. Preventing dental infections by reducing sugar consumption, rewarding excellence in oral hygiene and introducing fluoridation programmes, together with early diagnosis and treatment of disease, are important ways of preventing dental caries (Fig. 4) and periodontal disease, which in turn reduce the risk of dental infections.

Antimicrobial stewardship

Antimicrobial stewardship means optimising prescribing

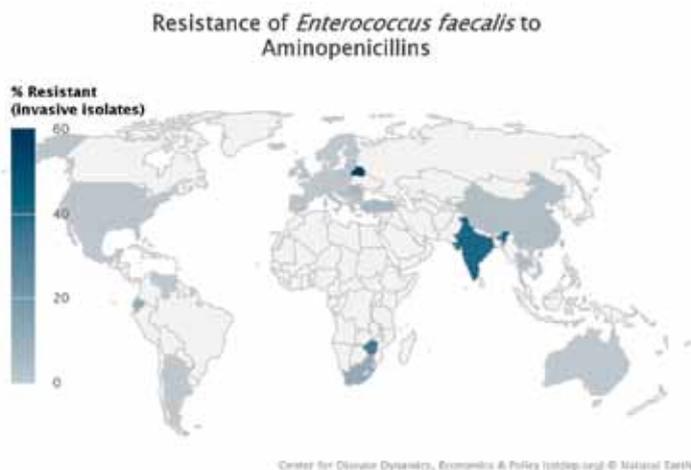


Fig. 3: Global heatmap showing the pattern of antibiotic resistance for a particular drug/bug combination (*E. faecalis* resistance to aminopenicillins such as amoxicillin). Reproduced with permission of: Centre for Disease Dynamics, Economics & Policy.



Figure 4: Combat antibiotic resistance by preventing tooth decay. Reproduced with permission of FDI World Dental Federation.

so that dental procedures are delivered whenever possible and antimicrobial drugs are only used when necessary. Antimicrobial stewardship programmes are interventions aimed at promoting the use of antimicrobials appropriately, i.e. in accordance with guidance. National guidance based on locally relevant factors (such as local patterns of antibiotic resistance, availability of high-quality antibiotics and access to dental care) sit at the heart of efforts to optimise antibiotic prescribing. In some cases, significant investment and resources may be required to develop and implement national guidelines which are fit for the local context, rather than based on research and data from other countries.

Awareness raising

Members of the dental team hold a high degree of respect within local communities, and there is a responsibility to use this privileged position to raise awareness about antibiotic resistance among the general population, as well as with patients. Dental professionals are skilled communicators who are well placed to deliver these public health messages; demonstrating judicious use of antibiotics is an important part of this messaging. An excellent way for people to highlight their commitment and raise awareness about antibiotic resistance is provided by the Antibiotic Guardian pledge scheme (www.antibioticguardian.com).

Taking the lead

The FDI white paper encourages national dental associations (NDAs) to make a clear and public commitment to tackling antibiotic resistance, including advocating for dentistry to be explicitly included in the National Action Plans for tackling antibiotic resistance (as per the WHO global action plan). The influences on dental antibiotic prescribing are different from other aspects of primary healthcare, and this has been clearly demonstrated during 2020. While restricted access to healthcare professionals during Covid-19 lockdowns led to a reduction in antibiotic use by most primary healthcare professions, a sharp increase by dentists has been noted in several countries.

In the absence of the opportunity to carry out dental procedures, difficult decisions were required about how best to balance the risks and benefits for patients. Dentists in England followed guidance from the authorities, and antibiotic prescribing increased in most parts of England reaching a peak in June 2020, just before dental practices re-opened to treat patients face to face. Ensuring access for all to dental care is vital to optimising antibiotic use and national dental associations should highlight the importance of including it within the National Action Plans and local antimicrobial stewardship programmes.

Conclusion

Antibiotics are essential to modern medicine and can be lifesaving drugs. Everyone is vulnerable to antibiotic resistance and everyone has a role in tackling it. Minimising resistance and ensuring the judicious use of antibiotics is the joint responsibility of everyone working in the healthcare sector. The risks of antibiotic use for patients need to be balanced against the benefits. There is no one-size-fits-all solution to tackling antibiotic resistance as factors influencing it are so different between places and over time. The dental profession's role in tackling antibiotic resistance is further defined in the FDI's white paper (including its online library of resources from around the world). ■

References

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