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Antimicrobial resistance – how do we tackle this risk?

Current issues: antimicrobial resistance

Antimicrobial resistance (AMR) is a type of drug resistance where a microorganism is able to survive exposure to an antibiotic or antifungal through genetic mutation; it is the bacteria or fungus – not humans or animals – which become resistant to the drug, with the resistant microbe ultimately thriving. This article explores the threat AMR poses to society through worsening mortality, morbidity and medical costs, and by natural extension, the impact on insurers.

United Kingdom and United States life expectancy at birth has increased by roughly 30 years over the last century with much of the improvement attributable to the discovery of antibiotics [1]. While matters such as much-publicised austerity measures and the obesity epidemic have hampered continued improvements in life expectancy, the more insidious threat of antimicrobial resistance continues to progress and with much less airtime than its counterparts.

In human medicine, the major problem of the emergence of resistant bacteria is due to misuse and overuse of antibiotics by doctors as well as by patients, although overuse of antibiotics in animal feed and veterinary medicine is also a contributing factor.

Topically, there are concerns that standard treatment protocols of broad-spectrum antibiotics for severe pneumonia – regardless of cause – could worsen antimicrobial resistance as the world deals with the current COVID-19 crisis[2].

> "We have reached a critical point and must act now on a global scale to slow down antimicrobial resistance."[3]
>
> Professor Dame Sally Davies, former UK National Chief Medical Officer

A report commissioned by the UK Government and released in May 2016, estimates that 700,000 global deaths can be attributed to AMR each year (approximately 23,000 in USA and 25,000 in Europe [4]). Reports such as this have contributed to a groundswell of international concern around the potential human and economic costs of AMR with the World Health Organisation, Food & Agriculture Organisation and United Nations General Assembly – amongst others – all having action plans in an effort to tackle the threat. The below graphic illustrates the number of annual deaths expected from AMR in 2050 if the threat goes unabated[5]. Note the preponderance of lives in regions with high population, high levels of infectious disease and comparatively poor sanitation.

[1] See Adedeji, W. A.
[2] See Bengoechea, J. A., & Bamford, C. G.
[3] See Review on Antimicrobial Resistance. (n.d. -a)
[4] See Cecchini, M., Langer, J., Slawomirski, L.
[5] See Review on Antimicrobial Resistance. (n.d. -c)

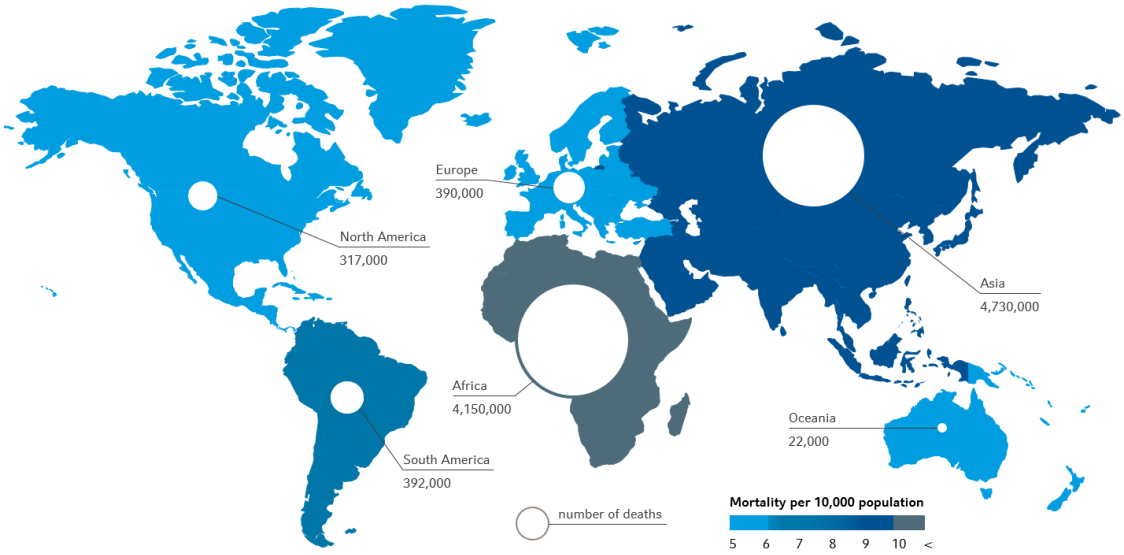

Figure 1: Estimated deaths attributable to antimicrobial resistance every year by 2050.

The Institute and Faculty of Actuaries established an AMR Working Group, which estimates a plausible 1% annual uplift in mortality by 2037 from E. Coli alone based upon extrapolation of Public Health England data [6]. Extreme scenario estimates for mortality uplift caused by E. Coli were between 2-3% per annum, and it is reasonable to assume such effects may not be solely driven by E. Coli should AMR continue to spread. Additionally, the UK Office for National Statistics has revised down its future projections for life expectancy at birth due to AMR, anticipating those born today are likely to have a shorter life expectancy than those born just a few years ago[7].

Beyond increased mortality, AMR leads to elevated morbidity manifesting through prolonged treatments, longer hospital stays, higher medical costs and related loss of productivity. Every year, more than 2 million people in the United States get infections that are resistant to antibiotics, estimated to add USD 20 billion to direct healthcare costs and an additional USD 35 billion of societal costs due to lost productivity[8]. The aforementioned UK Government study estimates the cumulative effect of AMR on global economic performance could increase to USD 100 trillion by 2050 if current trends continue. Infections may become untreatable, resulting in greater reluctance to perform common surgical procedures (such as caesarean section) or offer certain complex interventions (such as organ transplantation or chemotherapy) owing to the newfound gravity of contracting post-treatment infection. Thus, great medical advancement could be completely unwound with catastrophic effects on society, consistent with Dame Sally Davies warning:

> "Inaction seriously risks us returning to the dark ages of medicine."[9]
> Professor Dame Sally Davies

Tackling AMR

We must focus on measures to halt the spread of AMR. Presently, we cannot prevent the biological causes of AMR; however, we may address societal causes and focus efforts on replenishing the drug pipeline or developing alternative therapies to manage its impact. Indeed, there does now appear to be international acknowledgement of just how important this topic is. Beyond reducing indiscriminate use of antibiotics and improving sanitation, figure 2 illustrates some traditional and novel approaches to finding solutions[10].

[6] See Edwards et al.
[7] See Rudgard, O.
[8] See Centers for Disease Control and Prevention.
[9] See RT.
[10] See Review on Antimicrobial Resistance. (n.d. -b)

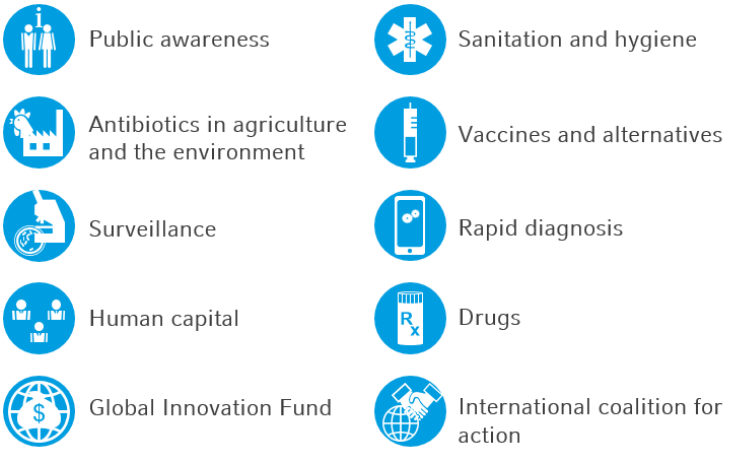

Figure 2: Ten approaches to tackle antimicrobial resistance.

Better drug selection

To enable more targeted use of antibiotics, scientists have developed a 'weather map' of antibiotic resistance to make it easier for physicians to determine which antibiotic is most suitable[11]. Similarly, a fibre-optic tube has been developed to tell almost instantly whether lung symptoms warrant treatment by antibiotics, with measures such as these aiming to reduce over-prescribing[12].

New drugs

US scientists have discovered a new family of antibiotics in soil samples. Tests show the compounds annihilate several bacterial diseases that have become resistant to most existing antibiotics, including the 'superbug' Methicillin-Resistant Staphylococcus Aureus (MRSA)[13].

New approaches

Given the time it takes to develop new antibiotics, scientists at the University of Queensland re-engineered existing antibiotics to bind to membranes of bacteria rather than to human cells – thus 'supercharging' the antibiotic[14].

By disrupting the connections in the protective 'wall' surrounding bacterial cells, scientists found they could diminish the bacteria's protective response to antibiotics, which is mediated via protein molecules inside the membranes[15].

There is a wavelength of UV light called 'far-UVC light' and while it is part of a spectrum of UV light, it cannot penetrate the skin like other components of UV light[16]. This particular wavelength should have the capability to kill all bacteria but still be safe for human exposure.

Genetic engineering

The treatment known as Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) carries considerable merit as it can attack and kill antibiotic-resistant bacteria as easily as antibiotic susceptible bacteria, targeting only the pathogens and potentially preserving our native bacteria[17].

Insurance implications

Life insurance companies must closely monitor epidemiological and biological developments of AMR over the next five years. A slowly progressive – but significant – increase in AMR-driven mortality and morbidity may affect overall pricing across all lines of life and health insurance products.

Underwriting and claims may need to assess diseases and risks that have been unknown to life insurers since the pre-antibiotic era, with relatively benign conditions starting to need evaluation. Underwriting manuals and philosophies may need close attention if the problem continues to develop as many think it could.

It is reasonable to assume that AMR on a larger scale would have a greater impact on children, the elderly, immunocompromised and any population with high disease burden, mirroring those insurance markets most likely to see the implications of increased AMR prevalence. Significant AMR would have a considerable impact on portfolio outcomes, particularly where rates are guaranteed for long durations.

[11] See Hamilton, E.
[12] See BBC.
[13] See GenomeWeb.
[14] See Weintraub, A.
[15] See Gabbatiss, J.
[16] See Buonanno et al.
[17] See Nybo, K.

Concluding thoughts

Left alone, AMR has the potential to negatively affect life expectancies and re-introduce risk to the most benign of disease and procedures. The financial impact could be very significant, with substantial cost burden inevitably falling to insurers. However, governments and institutions worldwide do appear to have reached consensus on the importance of finding solutions; this increased focus has led to some breakthroughs, which show promise in attenuating the risks AMR brings.

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Introducing Gareth Matthews

We are delighted to welcome Gareth Matthews as Chief Underwriter for the Hannover Re UK Life Branch. Following Stuart Johnson's retirement, Gareth took over with effect from 1 July 2020 and is responsible for underwriting and claims, departmental strategy, philosophy and research activities.

Gareth joined Hannover Re Ireland as Senior Underwriter in 2007. His role included international underwriting and claims across all product lines, internal and external audit, expert system rule writing and process determination.

In 2014, he took the position of Chief Underwriter, adding personnel management to his list of leadership skills along with corporate and risk management responsibilities.

Gareth brings a wealth of expertise to the team with 21 years' experience in the UK and other international markets. He studied business economics at the University of Liverpool and is a Fellow of the Academy of Life Underwriting (FALU) and Associate, Life Management Institute (ALMI).

Gareth's professional interests include insurtech, innovation, genetics and genomics as well as behavioural economics.

Welcome to the team, Gareth!

Farewell Stuart

After more than 6 successful years with Hannover Re and almost 40 years in the industry, working in South Africa, England, Scotland, Wales and the Republic of Ireland, Stuart Johnson has retired with effect from 1 July 2020.

His colleague and ReCent UK insights author, Paul Edwards, recounts: "Stuart was instrumental in key leadership roles at Legal and General, Bright Grey (now part of Royal London) and Vitality Life before moving to reinsurance, first with Partner Re and then Hannover Re. He championed changes in practices that are still in place today (rather topically, working from home) and had an expert eye for supporting talents, paving the career paths of many high fliers and influencers in the protection industry in the UK and abroad."

We would like to thank Stuart for his commitment and contributions to the UK Life Branch – most recently, enabling a seamless transition into working from home – and wish him all the best for his well-deserved retirement.

Stay in touch with Stuart on LinkedIn

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