Munich RE

MEDICAL RISK RADAR

Antimicrobial resistances – assessment of the current situation

Antimicrobial drugs are medicines that fight a range of infections, including those caused by bacteria (antibiotics), viruses (antivirals), fungi (antifungals) and parasites (including antimalarials).[1] Antibiotics, for example, have been invaluable in treating bacterial infections in humans for almost a century, making them a key element of modern medicine across the globe. In recent years, however, research has shown that they are beginning to lose their effectiveness, which potentially could significantly increase the danger for anyone undergoing medical treatment.

Indeed, estimates suggest that the mortality rate due to antimicrobial resistance (AMR) might soar from 700,000 deaths every year worldwide to a staggering 10 million a year by 2050. In addition to the cost in lives, the cumulative impact of AMR to economic output could rise to around USD 100 trillion by the same year.[2]

The antibiotic colistin is a prime AMR example that highlights the direction of travel: for many years it was rarely used on humans because of its kidney-damaging side-effects, although it has been used extensively in veterinary medicine. In recent years, however, colistin has again become a last-resort treatment for some patients with specific hard-to-treat bacterial infections. Worryingly, and reflecting the decreasing impact of antimicrobials, the effectiveness of colistin is now diminishing.[3]

Moreover, in November 2015, scientists announced the emergence of E.coli bacteria in China carrying the MCR-1 gene, which makes bacteria resistant to colistin. An infection with E.coli bacteria can cause gastroenteritis and even kidney failure. A study in *The Lancet* medical journal describes this as the "breach of the last group of antibiotics".[4] A woman from Pennsylvania in the US was also found with E.coli bacteria carrying the MCR-1 gene – although it proved not to be resistant to all antibiotics, scientists fear that because it can share its colistin resistance with other bacteria it raises the risk that pan-resistant bacteria could develop.[5]

In order to combat AMR, experts have called for a fundamental change in the way antibiotics are consumed and prescribed, firstly by lowering demand.[6] This can be done by educating people so they understand that antibiotics should only be used when needed. This should be carried out alongside the promotion of vaccines. In addition, there should be a global public campaign to increase awareness of AMR. Finally, whether by increasing access to clean water in developing countries or limiting superbugs in hospitals, we need to improve human hygiene, focus on preventing infections and speed up diagnoses. Another way to lower demand is to vastly reduce the use of antibiotics in farming.

Secondly, in order to combat infections resistant to medicines, scientists need to be given the means to increase the number of effective antimicrobial drugs to defeat infections that are now resistant to existing medicines. To do this requires a sufficiently well-funded "Global Innovation Fund" for research into AMR, better investment in new drugs and improvements to existing ones.

Thirdly, the success of lowering demand for, and greater investment in, antimicrobial drugs is predicated on building a global coalition that focuses on AMR – this should be underpinned by the G20 and UN. Of course, the cost of all this will not be cheap, and a recent estimate for adequately funded global action on AMR over the next decade is around USD 40 billion.[7]

Until recently, resistant infections were mainly associated with hospitals and care settings. In the future, however, resistant infections could also be seen in the wider communities of well-developed, industrialised countries – this will be seen as having an effect on mortality and morbidity, as well as on hospital resources and healthcare costs, because of the associated risks in four key areas:

Firstly, in globally-occurring common bacterial infections, formerly considered to be benign and "easy to cure". Secondly, there might be an impact with respect to life-threatening infectious diseases such as pneumonia, tuberculosis, HIV and malaria. Thirdly, there is the risk in "routine" surgical procedures that require prophylactic antibiotic treatment (such as caesarean sections or hip replacements). A fourth area to consider is patients with health conditions where effective antibiotic treatment is crucial (organ transplants and cancer chemotherapy, for instance) and which leave them highly vulnerable to bacterial infections.

However, it is worth noting that a lot of this will be mitigated – if not even prevented – if new antimicrobial drugs are developed, and new ways to fight infectious diseases, such as genetic engineering, become a reality.

In the life assurance industry, AMR does not require immediate action, but the close monitoring of epidemiological and biological developments within the next five to ten years. A slowly progressive but nevertheless significant increase in AMR-driven mortality and morbidity may affect overall pricing of life assurance products at some point. Underwriting and claims may need to assess diseases and risks that have been unknown to life assurance since the pre-antibiotic era. Relatively benign conditions will need to be re-evaluated and may fall into different risk classes as AMR may make these conditions unpredictable – for example, if a simple sinusitis becomes a disabling or even life-threatening disease again.

On the health insurance side, treatment costs will be the major downside of AMR. Comparably cheap antibiotics, such as penicillin, need to be replaced by antibiotics that are either more costly or expose the patients to more side-effects, which then generate additional treatment costs. New (and desperately needed) antimicrobial drugs or therapies to fight infectious diseases tend to be significantly more expensive compared to established therapies, too. Other consequences of AMR are easily measured and expressed in financial terms, such as extra days of hospitalisation and additional costs of diagnostic testing.

Moreover, AMR will also have significant effects on the health care infrastructure, though these are more difficult to calculate in terms of costs. Patients who are infected with a resistant pathogen should be isolated and treated as quickly as possible to control the spread of infection. To control resistance, hospitals must provide access to isolation facilities and specialised laboratories to properly test and rapidly identify AMR infections. The efforts in terms of time and costs for the sterilisation of medical equipment and facilities will rise, and overall may reduce the efficiency of hospital processes. Business interruptions due to an uncontrolled spread of resistant bacteria and the need to close down wards or even hospitals for disinfection measures – as already happens today – may become more frequent. All this will result in increased healthcare costs and should encourage healthcare providers and health insurers to promote a reasonable use of antimicrobial drugs today – for example, by avoiding unnecessary prescribing of antibiotics for trivial infections.

In summary, AMR is a good example of an medical risk that may affect the health and life assurance industry in various ways. However, a precise prediction of the extent of AMR, ranging from falling back into a pre-antibiotic era to the development of new drugs that will mitigate if not even prevent this development, is difficult. The life and health medical experts at Munich Re are observing both aspects of AMR closely.

Our Experts

Dr. Özer Bebek
Senior Medical Consultant
Tel.: +49 89 3891-9780
obebek@munichhealth.com

Dr. Petra Robertson
Medical Consultant
for facultative underwriting of
complex and rare medical risks
Tel.: +49 89 3891-6190
probertson@munichre.com

Literature

1 *Tackling Drug-Resistant Infections Globally: Final Report And Recommendations The Review On Antimicrobial Resistance*, chaired by Jim O'Neill, Executive Summary, p. 10

2 *Tackling Drug-Resistant Infections Globally: Final Report And Recommendations The Review On Antimicrobial Resistance*, chaired by Jim O'Neill, Executive Summary, p. 4 http://amr-review.org/

3 *Tackling Drug-Resistant Infections Globally: Final Report And Recommendations The Review On Antimicrobial Resistance*, chaired by Jim O'Neill, Executive Summary, p. 10

4 *Emergence of plasmid-mediated colistin resistance mechanism MCR-1 in animals and human beings in China: a microbiological and molecular biological study*, The Lancet: http://www.thelancet.com/journals/laninf/article/PIIS1473-3099(15)00424-7/abstract

5 Centers for Disease Control and Prevention: http://www.cdc.gov/media/releases/2016/s0531-mcr-1.html

6 *Tackling Drug-Resistant Infections Globally: Final Report And Recommendations The Review On Antimicrobial Resistance*, chaired by Jim O'Neill, Executive Summary, pp. 4–7

7 *Tackling Drug-Resistant Infections Globally: Final Report And Recommendations The Review On Antimicrobial Resistance*, chaired by Jim O'Neill, Executive Summary, p. 7

Order number 302-08942

Picture credit: Shutterstock.com