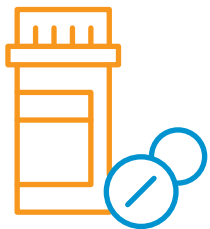


The Value of Vaccines in Preventing and Combating Antimicrobial Resistance (AMR)

Antimicrobial resistance, or AMR, is a significant public health problem affecting all areas of the world—negatively impacting millions of people and costing billions of dollars. In the United States alone each year, the CDC estimates that AMR bacteria cause at least two million infections and result in 23,000 deaths.¹

ANTIMICROBIAL RESISTANCE (AMR) IS A SERIOUS ISSUE ACROSS THE GLOBE.

Without policies to stop the spread of AMR globally, the current figure of 700,000 deaths per year could increase to 10 million deaths per year.²



Increases in AMR are associated with longer and more expensive treatment, increased risk for patients undergoing medical procedures, loss of productivity, and excess costs to the healthcare system.²

KEY TAKEAWAYS

AMR is the resistance of bacterial, viral, parasitic, and fungal microorganisms to antimicrobial medicines that were previously effective for treatment of infections.³

By 2050, the worldwide death toll could be a staggering one person every three seconds if AMR is not addressed immediately.⁴

Annual global GDP could fall by 3.8% and an additional 28.3 million people would fall into extreme poverty by 2050.⁵

Everyone has a role to play in reducing AMR from governments and regulatory bodies to nonprofit organizations and the healthcare industry.

COSTS IN PERSPECTIVE: THE GLOBAL IMPACT OF AMR

A CONTINUED INCREASE IN RESISTANCE WOULD **REDUCE THE WORLD GDP BY AN ESTIMATED 2–3.5% BY 2050.**⁶



\$6 TRILLION

estimated cumulative global economic loss over the next four decades if today's levels of infection and resistance rates remain the same⁷

\$120 TRILLION

estimated cumulative global economic loss over the next four decades if there were no longer any effective antimicrobial treatments available to treat infections⁷

THE VALUE OF MEDICINES: THE ROLE OF VACCINES IN AMR PREVENTION

The good news is we are not defenseless in this fight. In addition to new guidelines on antibiotic use and the development of new drugs, we already have a powerful tool at our disposal: **vaccines**.

Vaccines are the first line of defense against AMR in that they can help prevent an infection before it ever takes hold, which means we can do two things:

1

We can help prevent an individual from ever developing an infection which could reduce overall antibiotic utilization; and

2

We can help reduce the transmission and circulation of certain types of bacteria, including strains that are in fact antibiotic resistant.



Vaccines are critical in helping to combat the growing AMR crisis.



It is estimated that universal coverage with a pneumococcal conjugate vaccine could avert up to **11.4 million days of antibiotic therapy** annually in children younger than five years of age.

For children under 5 years, this amounts to a 47% reduction in days on antibiotics per year with a pneumococcal vaccine (PCV) that can prevent pneumonia.⁸



Since the introduction of the Hib vaccine, several studies have seen a correlation between use of the Hib vaccine and a reduction in resistance to one or more antibiotics, including a **50 percent decrease in resistance to ampicillin and related antibiotics** across all ages in a 10-year Italian study after universal introduction of the vaccine in 1999.⁹



In the province of Ontario, the introduction of a universal influenza immunization program for everyone aged 6 months and older in 2000 resulted in a **64 percent decrease in influenza-associated respiratory disease antimicrobial prescriptions**.¹⁰

WORKING TOGETHER TO ADDRESS AMR

A mix of different, complementary incentives is needed to encourage increased AMR-focused antibiotic and vaccine development—for example, transferable regulatory data/marketing exclusivity, IP mechanisms, and/or priority review vouchers (tPRV), and R&D tax credits. Each should, of course, be considered within the framework of the regulatory and IP systems of the country.

It is important that we all advocate for health policies and education that increase access to, and adoption of, vaccines along with better stewardship of antibiotic drugs.

EACH STAKEHOLDER HAS AN IMPORTANT ROLE TO PLAY IN PROTECTING LIVES.



Industry



Government and Policy Makers



Healthcare Providers



Nonprofit Organizations



Patients

PFIZER'S COMMITMENT TO COMBAT AMR

Pfizer has a long tradition in infectious disease R&D resulting in vaccines and anti-infectives that continue to have a significant impact on patients' lives. Pfizer was one of the leaders in the development of the industry Declaration on Combating Antimicrobial Resistance and the subsequent Industry Roadmap for Progress on Combating Antimicrobial Resistance released by 13 pharmaceutical companies on September 20, 2016. Pfizer is committed to continuing its role in the development of new strategies among governments, private industry, and NGOs for increased public education and to spur new innovation.

Pfizer's R&D focus in this space supports development of medicines for both treatment and prevention. We apply our expertise in vaccine technology to this important area, which we believe will enable us to impact patients' lives. Pfizer has a rich history in vaccine research and development; we have played a role in nearly eliminating the world of deadly diseases like smallpox and polio.

Pfizer believes that vaccines are essential tools in our fight against antibiotic-resistant infections. By reducing infections caused by vaccine-preventable diseases and helping to limit their transmission, vaccines may allow providers to prescribe antibiotics less frequently and, therefore, to be used more sparingly. Pfizer's vision is to protect lives with our broad portfolio of innovative vaccines that fight serious diseases worldwide and meet the needs of the global community we serve.

Pfizer is committed to doing our part to save lives from vaccine-preventable diseases and reduce AMR.



ACTIVE STEWARDSHIP

to ensure patients receive the correct antibiotic, according to independent guidelines, only if needed and for the right duration



INNOVATIVE SURVEILLANCE TOOLS

to help physicians better understand current resistance patterns



GLOBAL POLICY LEADERSHIP

to facilitate antibiotic development and proper use



DIVERSE PORTFOLIO

medicines and vaccines to treat and prevent serious infections around the world



MANUFACTURING

responsible practices that do not harm human health or the environment

REFERENCES

- 1 Centers for Disease Control and Prevention. Antibiotic Resistance Threats in the United States. 2013. Available at: <http://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf>.
- 2 O'Neill, J. (2016). Tackling Drug-Resistant Infections Globally: Final Report and Recommendations. The Review on Antimicrobial Resistance. Available at: https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf.
- 3 World Health Organization. (2017). Fact sheets on sustainable development goals: health targets Antimicrobial Resistance. Available at http://www.euro.who.int/__data/assets/pdf_file/0005/348224/Fact-sheet-SDG-AMR-FINAL-07-09-2017.pdf?ua=1.
- 4 O'Neill, J. (2016). Tackling Drug-Resistant Infections Globally: Final Report and Recommendations. The Review on Antimicrobial Resistance. Page 75. Available at: https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf.
- 5 The World Bank. (2016). By 2050, drug-resistant infections could cause global economic damage on par with 2008 financial crisis. Available at: <http://www.worldbank.org/en/news/press-release/2016/09/18/by-2050-drug-resistant-infections-could-cause-global-economic-damage-on-par-with-2008-financial-crisis>.
- 6 Center for Disease Dynamics, Economics & Policy. State of the World's Antibiotics, 2015. 2015. CDDEP: Washington, D.C. Available at: http://cddep.org/publications/state_worlds_antibiotics_2015#sthash.Z7YFdBcr.kN1wswHh.dpbs.
- 7 Taylor, J., Lichten, C.A., Smith, E. (2016). The Global Economic Costs of Antimicrobial Resistance. Research and Development (RAND) Corporation. Available at: <https://www.rand.org/blog/2016/05/the-global-economic-costs-of-amr.html>.
- 8 R Laxminarayan, et al. Access to effective antimicrobials: a worldwide challenge. 2016. DOI [http://dx.doi.org/10.1016/S0140-6736\(15\)00474-2](http://dx.doi.org/10.1016/S0140-6736(15)00474-2).
- 9 M Giufrè, et al. Ten years of Hib vaccination in Italy: Prevalence of non-encapsulated Haemophilus influenzae among invasive isolates and the possible impact on antibiotic resistance. 2011. *Vaccine* 29, 3857–3862.
- 10 JC Kwong, et al. The Effect of Universal Influenza Immunization on Antibiotic Prescriptions: An Ecological Study. 2009. *Clin Infect Dis.* 49 (5): 750-756 doi:10.1086/605087.