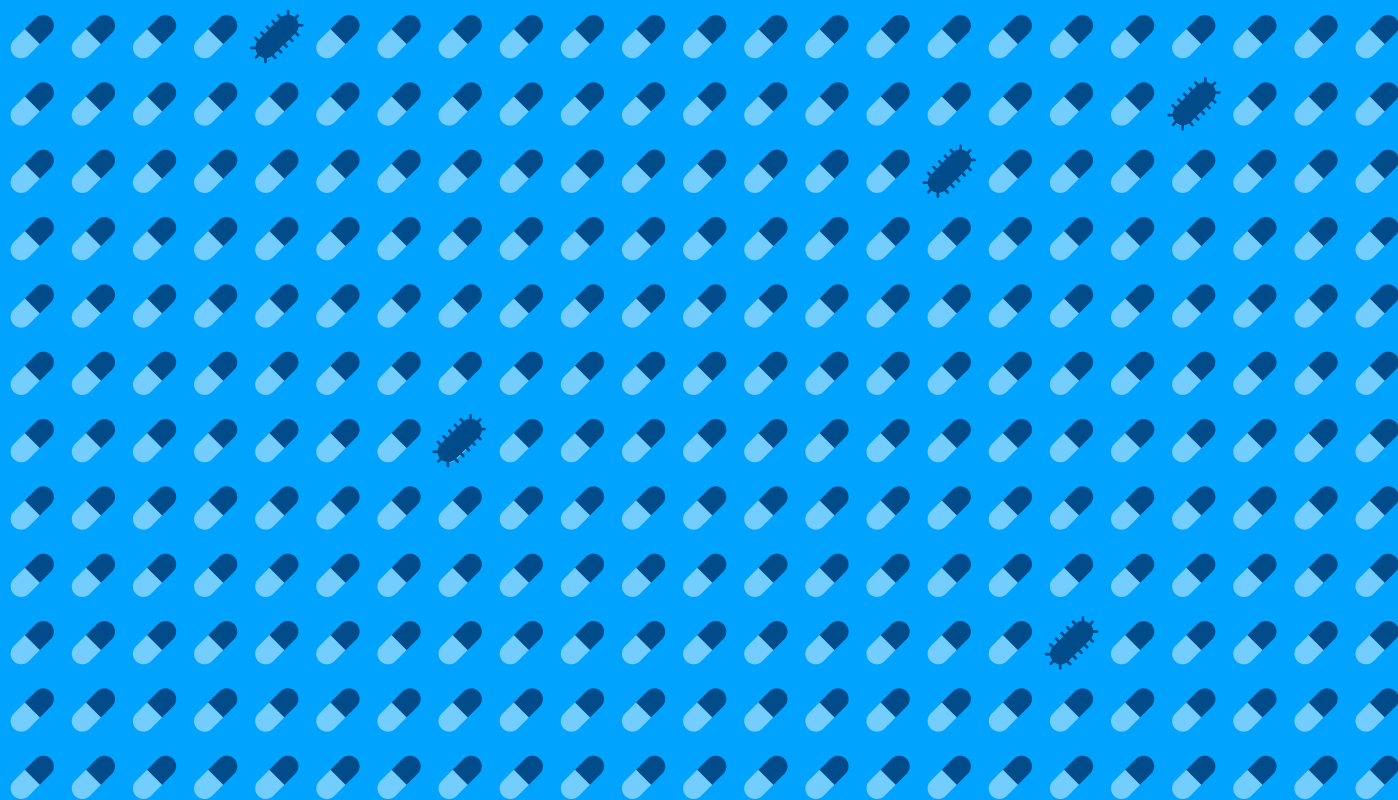


Fighting The Resistance:

AMR and the Uncertain Future of Healthy Longevity in the United States



Contents

Foreword	3
AMR Puts Healthy Longevity at Risk	4
COVID-19 Heightens AMR Urgency	5
AMR is Costly	6
Barriers to AMR Innovation	7
Policy Action to Accelerate AMR Solutions	8
References	9



Foreword

Mounting antimicrobial resistance (AMR) threatens our hope of achieving healthy longevity for all Americans. In order to meet this challenge, we must establish a national priority to actively pursue innovative antimicrobials and tools to combat AMR. Together, we can help safeguard healthy longevity in the United States and set a model for the world.

As many as 162,000 people in the U.S. lose their lives every year to multidrug-resistant infections, making drug-resistant infections the fourth-leading cause of death in the U.S.**

Since the 1950s, antimicrobials, including antibiotics, have become the cornerstone of modern medicine, curing otherwise-fatal infections in millions of children, conquering once-deadly conditions like pneumonia, and dramatically prolonging the length and quality of human life. Yet, today, infections have become increasingly resistant to the most effective antibiotics in our arsenal, and we are failing to replace our life-saving drugs with effective new ones. The loss of

effective antibiotics, in the absence of innovative solutions, threatens to transform our newfound longevity into a fight for survival for everyone, at all ages.

Antimicrobial resistance (AMR) is a growing threat to U.S. health, security, and longevity, causing at least 2.8 million infections each year in the U.S. alone.* As many as 162,000 people in the U.S. lose their lives every year to multidrug-resistant infections, making drug-resistant infections the fourth-leading cause of death in the U.S.,** and placing older adults at particular risk.^{1,2,3} For example, more than 80% of deaths due to C. diff occur in those 65 and older—and in the wake of COVID-19, the numbers are even higher.^{4,5,6} Protecting our older population must therefore be central to the fight against AMR.

*Number of multi-drug resistant infections is derived from a 2010 study and compared with 2019 CDC numbers on leading causes of death in the U.S. Due to this discrepancy, experts project that this number is likely higher in 2019 and may in fact be the third-leading cause of death, rather than the fourth.

**The true figure is likely substantially more than this 2010 estimate, but an exact figure cannot be calculated based on the publicly available data. In January 2021, a report published in The Lancet estimated 604,000 deaths associated with resistance in the U.S. and Canada combined.⁷

AMR Puts Healthy Longevity at Risk

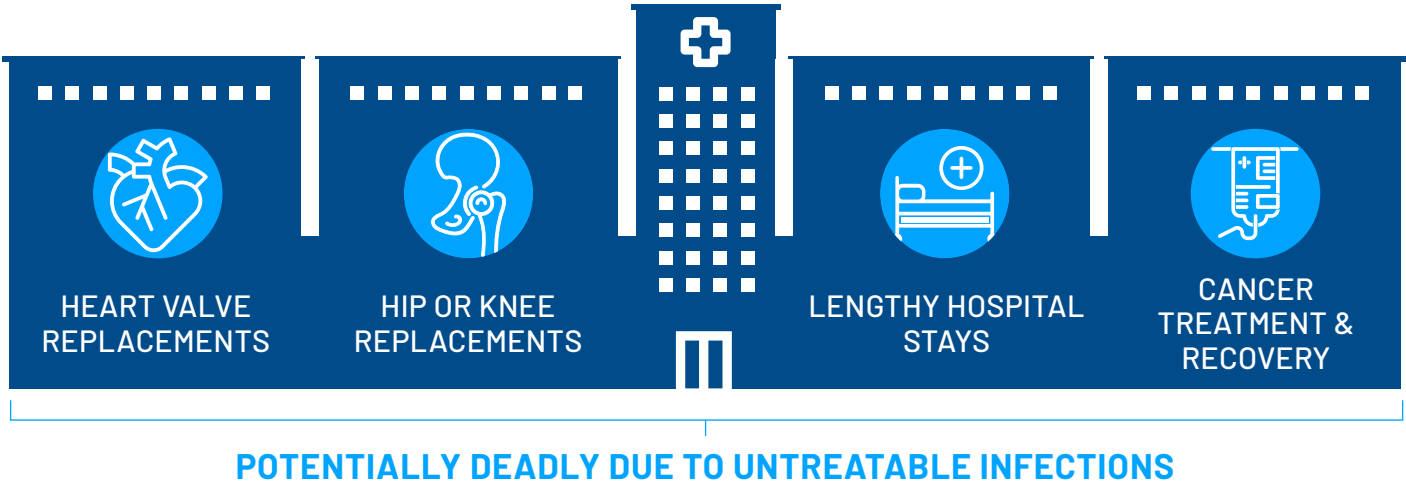
AMR is a principal barrier to healthy longevity, threatening the 20th-century progress in science, medicine, and sanitation that has led to our 21st-century miracle of longevity.

It puts one of our most vulnerable populations—older adults—at risk of previously treatable but now resistant infections^{8,9} and disproportionately claims the lives of those 65 and older.^{10,11}

Drug resistance forces older Americans to be hospitalized, collectively, for hundreds of thousands of additional days each year, and older adults experience increased vulnerability as they age due to waning immune response and increased exposure to pathogens in hospitals and care facilities,^{12,13,14} where debilitating and often fatal drug-resistant infections like C. diff and C. auris have exploded.

Further, AMR is undermining progress in health-care: **routine heart valve, knee, or hip replacements; hospital stays; or cancer treatment and recovery can turn deadly as a result of untreatable infections.**¹⁵ While the effects of AMR don’t always lead directly to death, it can also make healthy aging difficult, adding significantly to lost independence and quality of life.^{16,17} It also increases patient and hospital health costs due to longer and more frequent stays.^{18,19} With the growth of the older adult population rapidly outpacing other age groups, there is added urgency and shared imperative to find solutions for this growing crisis.^{20,21}

AMR Threatens Routine Medical Treatment



COVID-19 Heightens AMR Urgency

The COVID-19 pandemic is a warning for the challenges ahead if we do not solve for AMR.

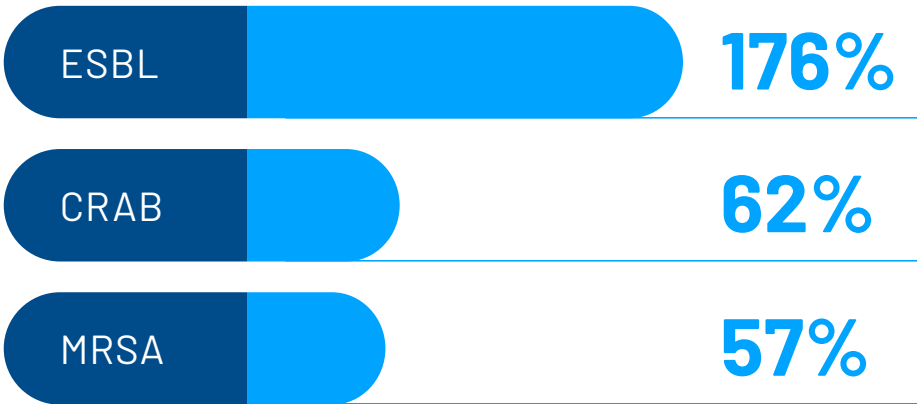
Data has shown that resistant pathogens know no borders and, with the case study of COVID-19, can travel easily between countries at an enhanced global scale. COVID-19 has also underscored the ongoing need for innovative vaccines, diagnostics, and treatments for present and future disease outbreaks. In order to take meaningful action against the threat of pandemics and AMR, the U.S. must coordinate nationally and globally.

Today, health security is at an even greater risk.

AMR will likely increase through the heavy use of antibiotics in COVID patient treatment. In severe viral respiratory infections, the immune system weakens and if a patient is infected with resistant bacteria, consequences can be fatal.²² Due to the increased hospitalization of COVID-19 patients, there has been a surge in hospital-onset antibiotic resistant pathogens, including a 57% increase in MRSA, a 176% increase in ESBL, and a 62% increase in CRAB.^{*,23} Now more than ever, health systems must prioritize action to counteract the rise of AMR.

A Surge in Hospital-Onset Antibiotic Resistant Pathogens

●
INCREASE AFTER
HOSPITALIZATION OF
COVID-19 PATIENTS



*MRSA (Methicillin-resistant Staphylococcus aureus), ESBL (Extended spectrum beta-lactamases), CRAB (Acinetobacter baumannii)

AMR is Costly

AMR is a central challenge to the Silver Economy. It is costly, undermining fiscal sustainability and even economic growth itself, and leading to an excess \$20 billion in healthcare costs in the U.S. alone.²⁴

The consequent impacts on health, caregiving, and lost productivity are devastating to all.²⁵ Without addressing AMR, the U.S. faces a 3.8% loss of global annual GDP by 2050, with an annual shortfall of \$3.4 trillion by 2030.²⁶

However, if the U.S. does prioritize solving for AMR, studies show substantial return on the investment: **13 times more economic benefit for the national economy than the initial investment of \$0.2 trillion.**²⁷

Solving for AMR Provides Tangible Benefits for the U.S. Economy



Barriers to AMR Innovation

To date, with all the visibility and attention to AMR, we still do not have the novel innovations we need to solve for the challenges of AMR.

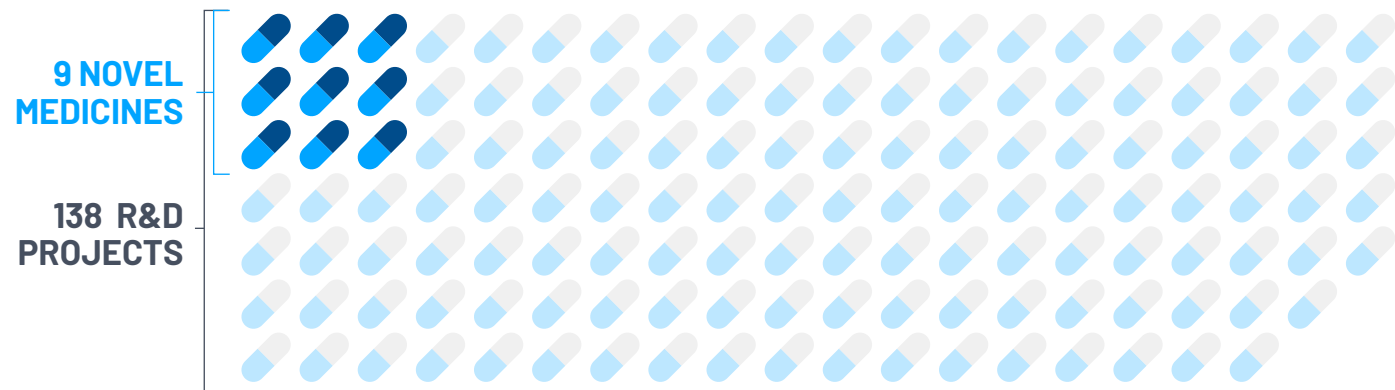
In fact, between 2000 and 2020, there was a nearly 75% decrease in FDA approvals for new antibiotics, compared to the previous 20 years.²⁸ As of 2020, “of the 138 R&D projects [that target antifungal medicines, antibacterial medicines, and antibacterial vaccines] in the pipeline, only nine medicines in the clinical stages of development are considered novel, meaning they offer a lower risk of resistance.”²⁹

The unique and challenging market dynamics governing the development and introduction of new antimicrobials require innovative policy solutions. Antimicrobial innovation needs investment. Policies that support the development and

successful market entry of new therapies and diagnostic tools will restore a healthy innovation pipeline, support business and market growth, and ultimately enable continued longevity.

While the U.S. has shown a strong dedication to AMR through its 2015 National Action Plan for Combating Antibiotic Resistance through increasing stewardship, improving diagnostics and better monitoring, the simple fact of the lack of new antimicrobials available in our health system remains a critical threat to all.³⁰

Greater Need for Innovation in Solving for the Challenges of AMR



Policy Action to Accelerate AMR Solutions

Reducing the threat of AMR to healthy longevity starts with policy. While the U.S. has made significant progress in slowing the spread of resistance, if we are to successfully combat AMR, we must enable the discovery and development of new, more effective antimicrobials. To support this goal, advocates and policymakers alike must:

1.

Recognize innovation to address AMR as an integral strategy for achieving healthy longevity across the U.S.

2.

Support a sustainable and robust pull incentive, such as the PASTEUR Act, which aims to establish an innovative way to pay for critically needed antibiotics and paves the way for future therapies.³⁰ This new bill:

- a. Introduces a subscription model to encourage the discovery and development of new antibiotics that are critical for patient care and public health.
- b. Establishes a grant program to support the implementation of antibiotic stewardship programs in hospitals.
- c. Aids hospital reporting of antibiotic use and resistance data to the Centers for Disease Control and Prevention National Healthcare Safety Network.

3.

Support efforts to restructure reimbursement to healthcare institutions to improve patient access to appropriate and efficacious treatment.

4.

Strengthen the AMR National Plan to ensure older adult priorities and needs are central by improving surveillance efforts, accelerating the development of new therapeutics, and increasing international cooperation for global health security.

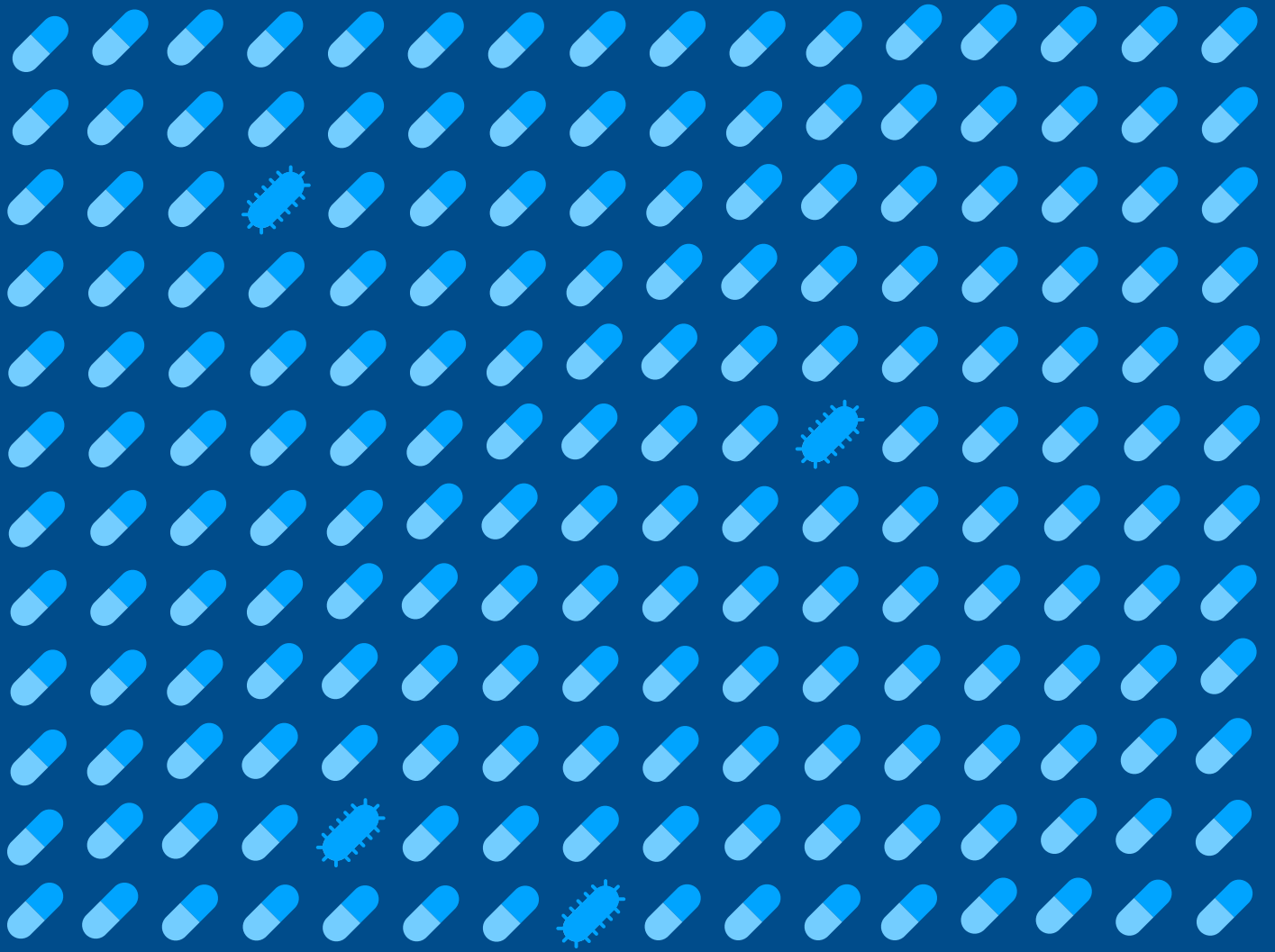
5.

Communicate with the public about AMR's threat to healthy longevity and health system sustainability and needed actions to combat it.

References

1. CDC. Antibiotic Resistance Threats in the United States, 2019. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2019.
2. Burnham JP, et al. (2019). Re-estimating annual deaths due to multidrug-resistant organism infections. *Infection Control & Hospital Epidemiology* 2019, 40, 112–113. doi: 10.1017/ice.2018.304
3. Leading Causes of Death in the U.S. National Center for Health Statistics. Centers for Disease Control and Prevention. March 1 2021. <https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm>
4. O'Neill, Jim. Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations. 'Review on Antimicrobial Resistance. Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations, 2014, pp. 1–20, Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations. https://amr-review.org/sites/default/files/AMR%20Review%20Paper%20-%20Tackling%20a%20crisis%20for%20the%20health%20and%20wealth%20of%20nations_1.pdf
5. Span, Paula. "Doctors See Gains Against 'an Urgent Threat,' C. Diff." NYT. Feb 2017. <https://www.nytimes.com/2017/02/10/health/clostridium-difficile-c-diff.html>
6. Ritchel, Matt et al. "New York Identifies Hospitals and Nursing Homes With Deadly Fungus." NYT. Nov. 2019. <https://www.nytimes.com/2019/11/13/health/candida-auris-resistant-hospitals.html?searchResultPosition=3>
7. "Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis." *The Lancet*, Jan. 2022. [https://doi.org/10.1016/S0140-6736\(21\)02724-0](https://doi.org/10.1016/S0140-6736(21)02724-0)
8. Span, Paula. Older Americans Are Awash in Antibiotics. *New York Times*. March 15 2019. <https://www.nytimes.com/2019/03/15/health/antibiotics-elderly-risks.html>
9. Sean X. Leng, MD, PhD, on COVID-19 and the Promise of Geroscience . American Federation for Aging Research. 2020. <https://www.afar.org/ask-the-expert/ask-the-expert-sean-x-leng-md-phd-on-covid-19-and-the-promise-of-geroscience>
10. O'Neill, Jim. Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations. 'Review on Antimicrobial Resistance. Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations, 2014, pp. 1–20, Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations. https://amr-review.org/sites/default/files/AMR%20Review%20Paper%20-%20Tackling%20a%20crisis%20for%20the%20health%20and%20wealth%20of%20nations_1.pdf
11. Span, Paula. Doctors See Gains Against 'an Urgent Threat,' C. Diff . *New York Times*. February 10 2017. <https://www.nytimes.com/2017/02/10/health/clostridium-difficile-c-diff.html>
12. Verma, Seema. Seema Verma: CMS's 'expanded pathway' for new antibiotics can help fight antimicrobial resistance. *STAT News*. November 6 2019. <https://www.statnews.com/2019/11/06/antimicrobial-resistance-cms-expanded-pathway/>
13. Verma, Seema. Aligning Payment And Prevention To Drive Antibiotic Innovation For Medicare Beneficiaries. *Health Affairs*. August 2 2019. <https://www.healthaffairs.org/doi/10.1377/hblog20190802.505113/full/>
14. World Population Ageing 2017. UN Department of Economic and Social Affairs, 2017, pp. 1–46, World Population Ageing 2017. https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf
15. Boucher H. Final Testimony, House Committee on Oversight and Reform, Subcommittee on National Security, AMR Hearing, June 26, 2019.
16. Span, Paula. Doctors See Gains Against 'an Urgent Threat,' C. Diff . *New York Times*. February 10 2017. <https://www.nytimes.com/2017/02/10/health/clostridium-difficile-c-diff.html>
17. Chapter 4. Health and economic burden of antimicrobial resistance. OECD Health Policy Studies, Stemming the Superbug Tide. November 2018. <https://www.oecd-ilibrary.org/sites/9789264307599-7-en/index.html?itemId=/content/component/9789264307599-7-en>
18. Friedman ND, Temkin E, Carmeli Y. *Clin Microbiol Infect*. 2016 May; 22(5):416–22.
19. Wozniak TM, Barnsbee L, Lee XJ, Pacella RE. Using the best available data to estimate the cost of antimicrobial resistance: a systematic review. *Antimicrob Resist Infect Control*. 2019;8:26. Published 2019 Feb 1. doi:10.1186/s13756-019-0472-z
20. Jacobs, Andrew, and Matt Richtel. "Nursing Homes Are a Breeding Ground for a Fatal Fungus." *The New York Times*, The New York Times, 11 Sept. 2019, www.nytimes.com/2019/09/11/health/nursing-homes-fungus.html?searchResultPosition=1
21. <https://www.census.gov/newsroom/press-releases/2018/cb18-41-population-projections.html>

22. Considerations for AMR in the Covid-19 pandemic. Joint Programming Initiative on Antimicrobial Resistance. April 2020. <https://www.jpiamr.eu/considerations-for-antibiotic-resistance-in-the-covid-19-pandemic/>
23. Dadgostar P. Antimicrobial Resistance: Implications and Costs. *Infect Drug Resist.* 2019;12:3903-3910. Published 2019 Dec 20. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6929930/>
24. Antimicrobial Resistance: Tackling a crisis for the health and wealth of nations, 2014.
25. Drug-Resistant Infections: A Threat to Our Economic Future. World Bank. March 2017. <http://documents.worldbank.org/curated/en/323311493396993758/pdf/final-report.pdf>
26. Drug-Resistant Infections: A Threat to Our Economic Future. World Bank. March 2017. <http://documents.worldbank.org/curated/en/323311493396993758/pdf/final-report.pdf>
27. Tomasi, Francesca. Less of the Same: Rebooting the antibiotic pipeline. Harvard University: Science in the News. July 3 2018. <http://sitn.hms.harvard.edu/flash/2018/less-rebooting-antibiotic-pipeline/>
28. More companies join the leaders, yet progress on AMR is slow. Antimicrobial Resistance Benchmark. 2020. <https://accesstomedicine-foundation.org/amr-benchmark/2020-benchmark>
29. National Action Plan for Combating Antibiotic-Resistant Bacteria, 2020-2025. ASPE. October 2020. <https://aspe.hhs.gov/pdf-report/carb-plan-2020-2025>
30. S.4760 - The PASTEUR Act. Congress.Gov. September 2020. <https://www.congress.gov/bill/116th-congress/senate-bill/4760/text?r=2&s=1>



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About the Global Coalition on Aging

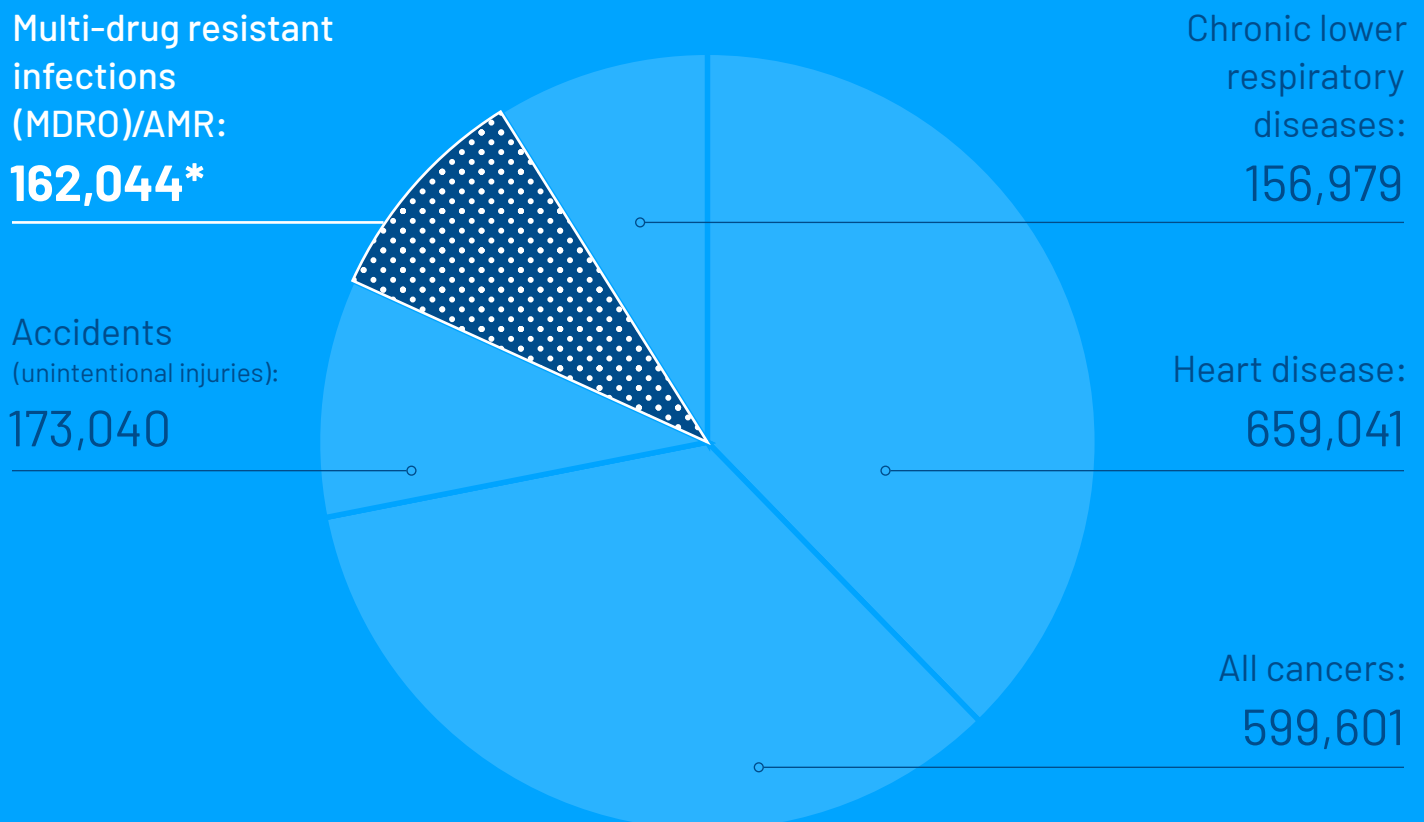
The Global Coalition on Aging aims to reshape how global leaders approach and prepare for the 21st century's profound shift in population aging. GCOA uniquely brings together global corporations across industry sectors with common strategic interests in aging populations, a comprehensive and systemic understanding of aging, and an optimistic view of its impact. Through research, public policy analysis, advocacy, and strategic communications, GCOA is advancing innovative solutions and working to ensure global aging is a path to health, productivity and economic growth.



AMR: A Threat to Healthy Longevity for all Americans

Antimicrobial resistance (AMR) and the lack of new drugs to treat infections pose a growing threat to the U.S. and the world. Even by 2010, as many as **162,000 people in the U.S.*** were losing their lives every year to drug-resistant infections, making this the fourth-leading cause of death in the U.S. compared to current numbers.¹

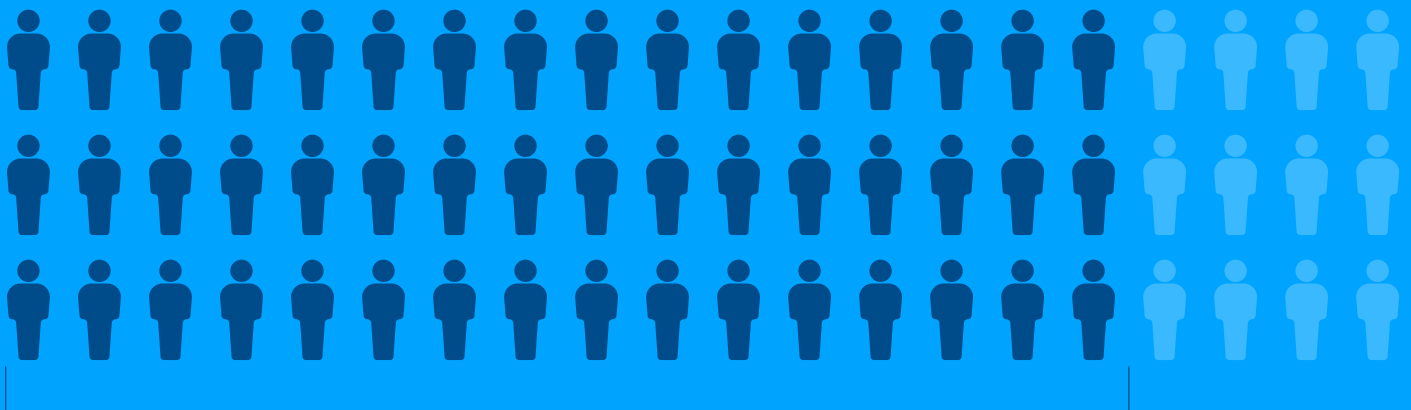
Top 5 Leading Causes of Death in the U.S. (2019):²



*The true figure is likely substantially more than this 2010 estimate, but an exact figure cannot be calculated based on the publicly available data. In January 2022, a report published in The Lancet estimated 604,000 deaths associated with resistance in the U.S. and Canada combined.³

Older adults account for the majority of new cases of drug-resistant infections and AMR-related deaths.^{4,5} Our inability to treat these infections forces older Americans to be hospitalized, collectively, for hundreds of thousands of additional days each year.^{6,7}

AMR Puts Seniors at Risk^{8,9,10}

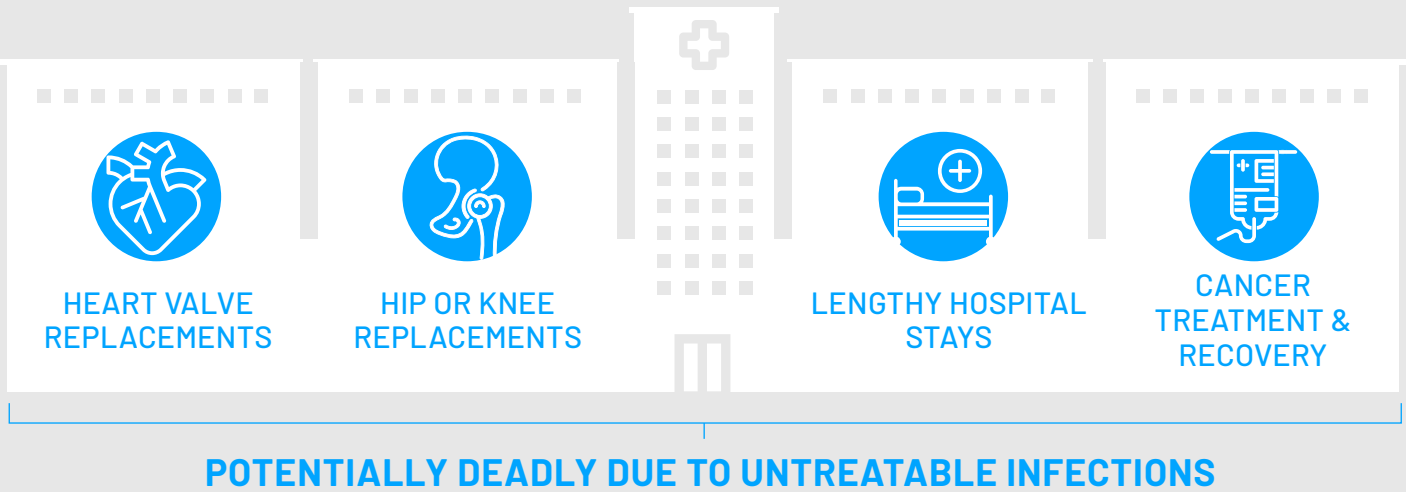


**80% OF C.DIFF DEATHS
OCCUR IN THOSE 65 AND OLDER**

For America's older adults, time is running out. And for all of us, each new untreatable infection is pushing the American healthcare system to the brink of disaster.

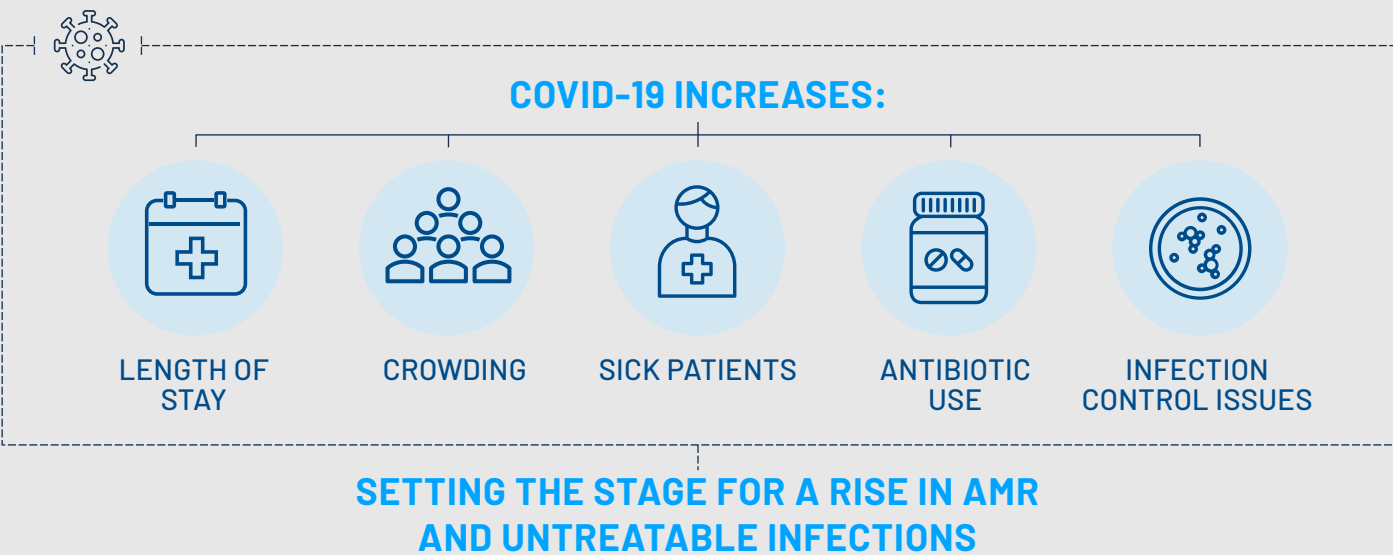
Undermining Our Healthcare System

AMR Threatens Routine Medical Treatment¹¹



While the effects of AMR don't always lead directly to death, AMR and our lack of new drugs to treat common infections pose a dire threat to healthy aging, adding significantly to lost independence and lowered quality of life.^{12,13}

COVID-19: The Perfect Storm for Rising AMR¹⁴



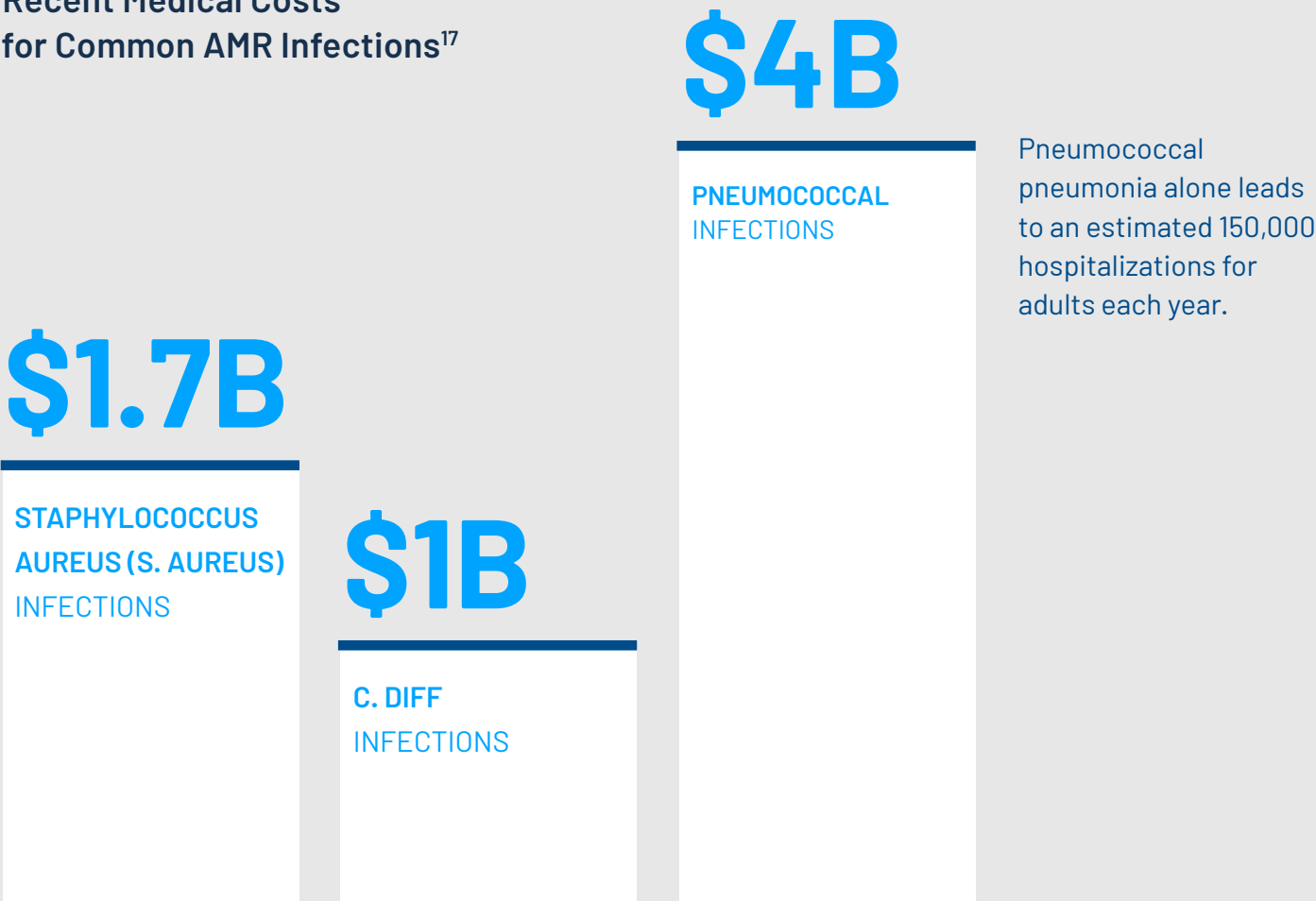
Unsustainable Costs Threaten Our National Economy

AMR is costly, undermining fiscal sustainability and even economic growth itself.

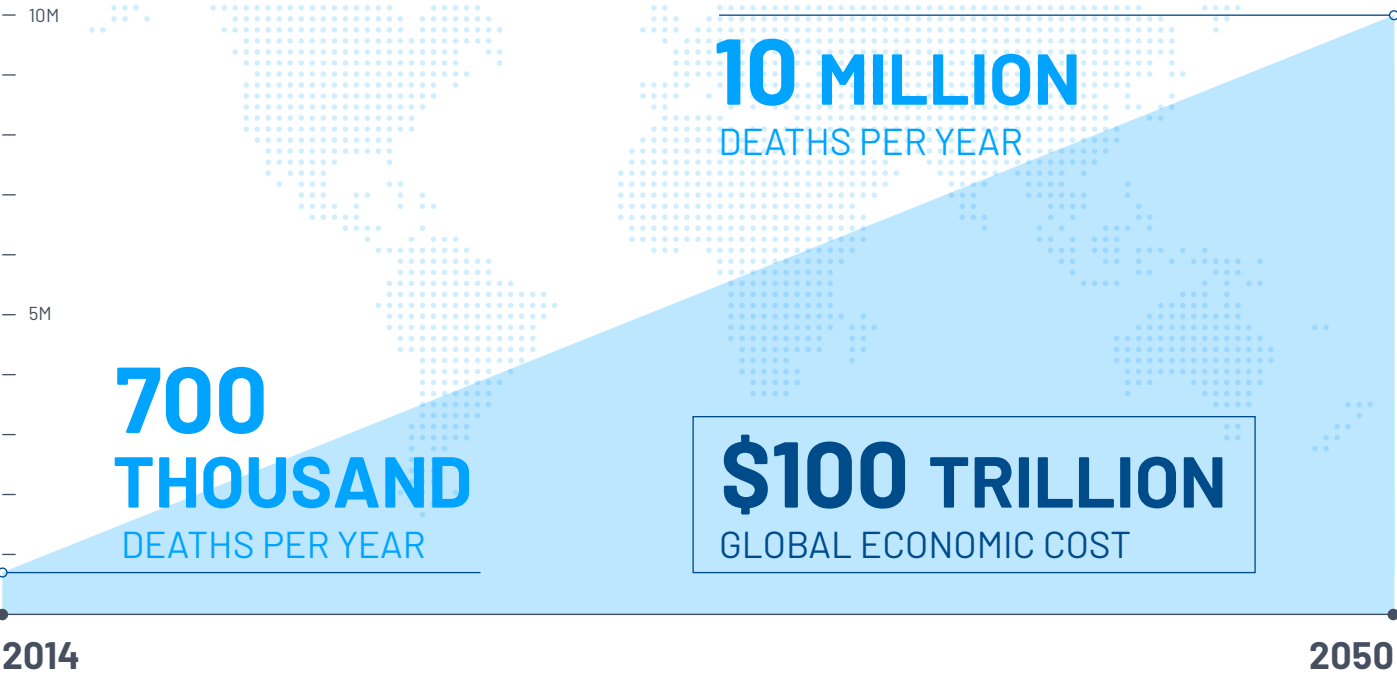
Annual AMR-Related Costs in the U.S.^{15,16}



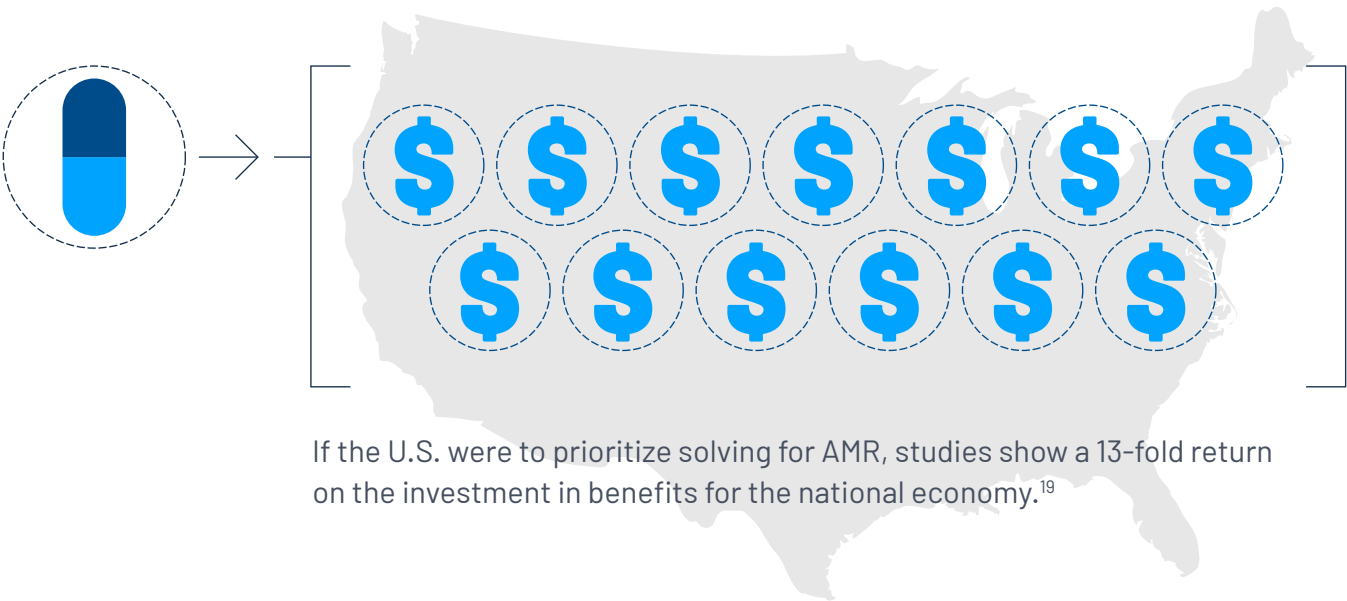
Recent Medical Costs for Common AMR Infections¹⁷

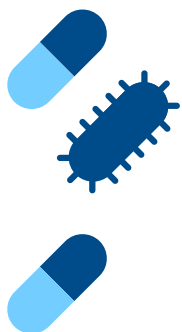


Global Human and Economic Costs of AMR¹⁸



Solving for AMR Provides Tangible Benefits for the U.S. Economy





How Can We Solve for AMR?

To date, with all the visibility and attention to AMR, there are still no effective innovations solving for the challenges of AMR.

Reducing the threat of AMR to healthy longevity starts with policy. While the U.S. has made significant progress in slowing the spread of resistance, if we are to successfully combat AMR, we must enable the discovery and development of new, more effective antimicrobials.

To support this goal, advocates and policymakers alike must:

1. Recognize innovation to address AMR as an integral strategy for achieving healthy longevity across the U.S.
2. Support a sustainable and robust pull incentive, such as the PASTEUR Act, which aims to establish an innovative way to pay for critically needed antibiotics and paves the way for future therapies.²⁰
3. Support efforts to restructure reimbursement to healthcare institutions to improve patient access to appropriate and efficacious treatment.

References

1. Burnham JP, et al. (2019). Re-estimating annual deaths due to multidrug-resistant organism infections. *Infection Control & Hospital Epidemiology* 2019, 40, 112–113. doi: 10.1017/ice.2018.304.
2. Burnham JP, Olsen MA, Kollef MH. Re-estimating annual deaths due to multidrug-resistant organism infections. *Infect Control Hosp Epidemiol.* 2019;40(1):112–113. doi:10.1017/ice.2018.304; Leading Causes of Death in the U.S. National Center for Health Statistics. Centers for Disease Control and Prevention. March 1 2021. <https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm>.
3. “Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis.” *The Lancet*, Jan. 2022. [https://doi.org/10.1016/S0140-6736\(21\)02724-0](https://doi.org/10.1016/S0140-6736(21)02724-0).
4. Verma, Seema. Seema Verma: CMS’s ‘expanded pathway’ for new antibiotics can help fight antimicrobial resistance. *STAT News*. November 6 2019. <https://www.statnews.com/2019/11/06/antimicrobial-resistance-cms-expanded-pathway/>.
5. Verma, Seema. Aligning Payment And Prevention To Drive Antibiotic Innovation For Medicare Beneficiaries. *Health Affairs*. August 2 2019. <https://www.healthaffairs.org/doi/10.1377/hblog20190802.505113/full/>.
6. Verma, Seema. Seema Verma: CMS’s ‘expanded pathway’ for new antibiotics can help fight antimicrobial resistance. *STAT News*. November 6 2019. <https://www.statnews.com/2019/11/06/antimicrobial-resistance-cms-expanded-pathway/>.
7. Verma, Seema. Aligning Payment And Prevention To Drive Antibiotic Innovation For Medicare Beneficiaries. *Health Affairs*. August 2 2019. <https://www.healthaffairs.org/doi/10.1377/hblog20190802.505113/full/>.
8. O’Neill, Jim. Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations. ‘Review on Antimicrobial Resistance. Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations, 2014, pp. 1–20, Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations. https://amr-review.org/sites/default/files/AMR%20Review%20Paper%20-%20Tackling%20a%20crisis%20for%20the%20health%20and%20wealth%20of%20nations_1.pdf.
9. Span, Paula. “Doctors See Gains Against ‘an Urgent Threat,’ C. Diff.” *NYT*. Feb 2017. <https://www.nytimes.com/2017/02/10/health/clostridium-difficile-c-diff.html>.
10. Ritchel, Matt et al. “New York Identifies Hospitals and Nursing Homes With Deadly Fungus.” *NYT*. Nov. 2019. <https://www.nytimes.com/2019/11/13/health/candida-auris-resistant-hospitals.html?searchResultPosition=3>.
11. Boucher H. Final Testimony, House Committee on Oversight and Reform, Subcommittee on National Security, AMR Hearing, June 26, 2019.
12. Span, Paula. “Doctors See Gains Against ‘an Urgent Threat,’ C. Diff.” *NYT*. Feb 2017. <https://www.nytimes.com/2017/02/10/health/clostridium-difficile-c-diff.html>.
13. Chapter 4. Health and economic burden of antimicrobial resistance. OECD Health Policy Studies, Stemming the Superbug Tide. November 2018. <https://www.oecd-ilibrary.org/sites/9789264307599-7-en/index.html?itemId=/content/component/9789264307599-7-en>.
14. Srinivasan, Arjun. MD. The Intersection of Antibiotic Resistance (AR), Antibiotic Use (AU), and COVID-19. Centers for Disease Control and Prevention. September 2020. <https://www.hhs.gov/sites/default/files/srinivasan-covid-and-amr-overview.pdf>.
15. Dadgostar P. Antimicrobial Resistance: Implications and Costs. *Infect Drug Resist.* 2019;12:3903–3910. Published 2019 Dec 20. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6929930/>.
16. Antibiotic resistance threats in the United States; 2013. <https://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf>.
17. Antibiotic Resistance Threats in the United States 2019. Centers for Disease Control and Prevention. December 2019. <https://www.cdc.gov/drugresistance/pdf/threats-report/2019-ar-threats-report-508.pdf>.
18. O’Neill J. Antimicrobial Resistance: tackling a crisis for the health and wealth of nations. The review on antimicrobial resistance. 2014. https://amr-review.org/sites/default/files/AMR%20Review%20Paper%20-%20Tackling%20a%20crisis%20for%20the%20health%20and%20wealth%20of%20nations_1.pdf.
19. Drug-Resistant Infections: A Threat to Our Economic Future. World Bank. March 2017. <http://documents.worldbank.org/curated/en/323311493396993758/pdf/final-report.pdf>.
20. S.4760 – The PASTEUR Act. Congress.Gov. September 2020. <https://www.congress.gov/bill/116th-congress/senate-bill/4760/text?r=2&s=1>.

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