

Detect and Protect Against Antibiotic Resistance

CDC's Initiative to outsmart this threat

The problem

It's been called public health's ticking time bomb. Antibiotic resistance—when bacteria don't respond to the drugs designed to kill them—threatens to return us to the time when simple infections were often fatal. Today, antibiotic resistance annually causes more than 2 million illnesses and 23,000 deaths in the United States. Tomorrow, if it continues on its current course, could be even worse:

- A simple cut of the finger could lead to a life-threatening infection.
- Common surgical procedures, such as hip and knee replacements, would be far riskier because of the danger of infection.
- Dialysis patients could develop untreatable bloodstream infections.
- Life-saving treatments that suppress immune systems, such as chemotherapy and organ transplants, could potentially cause more harm than good.

The solution

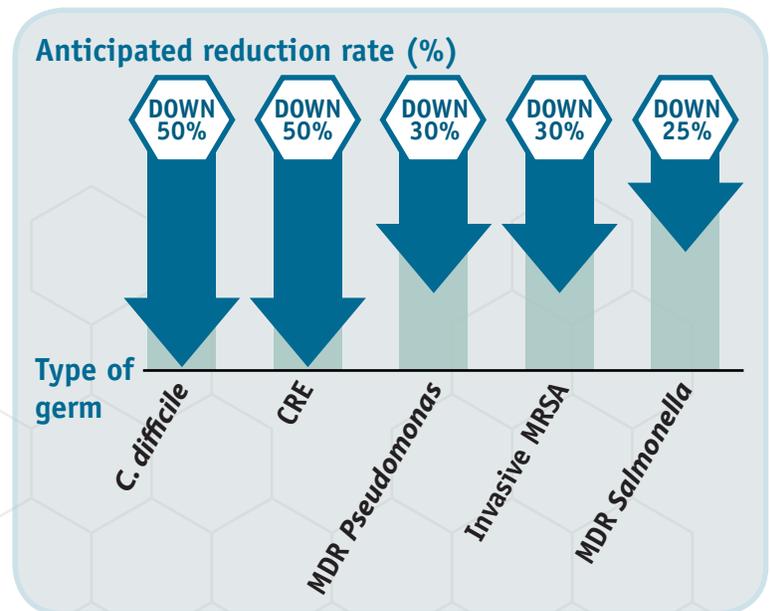
We need to outsmart antibiotic resistance—now. The **Detect and Protect Against Antibiotic Resistance Initiative** (known as the **AR Initiative**) gives us a good head start. The 2015 President's Budget requests \$30 million annual funding level for 5 years for the **AR Initiative**—part of a broader CDC strategy to target investment to achieve measurable results in four core areas:

- **Detect** and track patterns of antibiotic resistance.
- **Respond** to outbreaks involving antibiotic-resistant bacteria.
- **Prevent** infections from occurring and resistant bacteria from spreading.
- **Discover** new antibiotics and new diagnostic tests for resistant bacteria.

The results

With a \$30 million annual funding level over 5 years, CDC's **AR Initiative** could achieve a:

- 50% reduction in healthcare-associated *C. difficile*, which saves 20,000 lives, prevents 150,000 hospitalizations, and cuts more than \$2 billion in healthcare costs
- 50% reduction in healthcare-associated CRE infections
- 30% reduction in healthcare-associated multidrug-resistant (MDR) *Pseudomonas*, a common cause of healthcare-associated infections
- 30% reduction in invasive MRSA
- 25% reduction in MDR *Salmonella* infections



Taking aim: 7 antibiotic-resistant threats



1. **Clostridium difficile (C. difficile)** causes deadly diarrhea mostly in people who've recently had medical care and antibiotics.
2. **Carbapenem-resistant Enterobacteriaceae (CRE)** are nightmare bacteria that are resistant to nearly all antibiotics and spread easily.
3. **MDR Neisseria gonorrhoeae** causes gonorrhea and is showing resistance to antibiotics usually used to treat it.
4. **Extended-spectrum beta-lactamase-producing Enterobacteriaceae (ESBL)** are bacteria one step away from becoming CRE.
5. **MDR Salmonella** causes about 100,000 illnesses in the US each year; resistant infections are more severe.
6. **Methicillin-resistant Staphylococcus aureus (MRSA)** causes skin and wound infections, pneumonia, and bloodstream infections.
7. **MDR Pseudomonas** causes healthcare-associated pneumonia and bloodstream infections; some strains are resistant to nearly all antibiotics.

The details

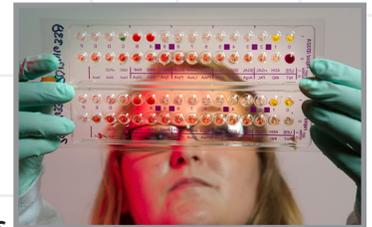
In 2013, CDC identified the four core actions needed to stay one step ahead of antibiotic resistance—detect and track patterns of antibiotic resistance, respond to outbreaks involving antibiotic-resistant bacteria, prevent infections from occurring and resistant bacteria from spreading, and discover new antibiotics and new diagnostic tests for resistant bacteria. CDC's **AR Initiative** lays out a roadmap for fighting resistance on two fronts:



Improve detection through regional labs

A new regional lab network and resistant-bacteria bank will speed up outbreak detection and production of new antibiotics and diagnostics.

- ▶ A new 5-region **AR Regional Lab Network** improves our response to outbreaks of infectious disease by **speeding up** the identification of the most concerning resistant threats. The Network helps in other ways—in **increasing susceptibility testing** (to see which antibiotics stop bacteria from growing) for high-priority bacteria like CRE and in **keeping pace with rapidly mutating bacteria** so labs are ready to respond to new threats. The Lab Network also accelerates development of **new diagnostics and antibiotics**. And because of innovations made possible by Advanced Molecular Detection (AMD), the Lab Network provides a **cutting-edge testing platform** that not only increases the amount of testing but also ensures that all labs in the network can easily share new discoveries.
- ▶ A new **Resistant-Bacteria Bank** (called AR Isolate Library), a unique centralized collection of samples of resistant bacteria that are made available to:
 - **Pharmaceutical companies** testing new antibiotic agents.
 - **Biotech and diagnostic companies** designing next-generation clinical tests.
 - **Researchers** evaluating the effectiveness of interventions to reduce antibiotic resistance.
- ▶ A new **public data portal** will show national trends as well as variations in antibiotic prescribing and resistance among states and regions.



Prevent infections and improve antibiotic prescribing practices—in healthcare facilities and in the community

Closer collaboration with healthcare facilities and large health systems will strengthen stewardship programs and reduce antibiotic resistance.

- ▶ **Establish the AR Prevention Collaboratives**—Groups of healthcare facilities in communities around the country that work together to implement best practices for **inpatient antibiotic prescribing and preventing infections**. The Collaboratives will **scale up, or extend the reach of interventions** that have been reducing or stopping antibiotic-resistant threats. The AR Prevention Collaboratives will also encourage **involvement of large health systems**, which will help bridge interventions between hospitals and long-term care facilities.
- ▶ **Target concerning community threats**, like MDR *Salmonella* and MDR *N. gonorrhoeae* infections.
- ▶ **Improve antibiotic stewardship** (meaning good antibiotic prescribing practices) by evaluating state-to-state variations in antibiotic use to improve outpatient prescribing nationwide.
- ▶ **Launch Antibiotic Adverse Event Study**, to see what effect antibiotics given to infants and young children have on future health problems, such as obesity, asthma, eczema, allergies, and *C. difficile* infections.



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