



CDC Plans to Battle Antimicrobial Resistance

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ANTIBIOTIC RESISTANCE THREATS in the United States, 2013


Estimated minimum number of illnesses and deaths caused annually by antibiotic resistance*:

At least

 **2,049,442** illnesses

 **23,000** deaths


**bacteria and fungus included in this report*



CARBAPENEM-RESISTANT ENTEROBACTERIACEAE



9,000
DRUG-RESISTANT
INFECTIONS PER YEAR



600
DEATHS

THREAT LEVEL
URGENT



⚠️ CRE HAVE BECOME RESISTANT TO ALL OR NEARLY ALL AVAILABLE ANTIBIOTICS ⚠️



DRUG-RESISTANT NEISSERIA GONORRHOEAE




246,000
DRUG-RESISTANT
GONORRHEA INFECTIONS




820,000
GONOCOCCAL
INFECTIONS PER YEAR

THREAT LEVEL
URGENT






CLOSTRIDIUM DIFFICILE




250,000
INFECTIONS PER YEAR



14,000
DEATHS

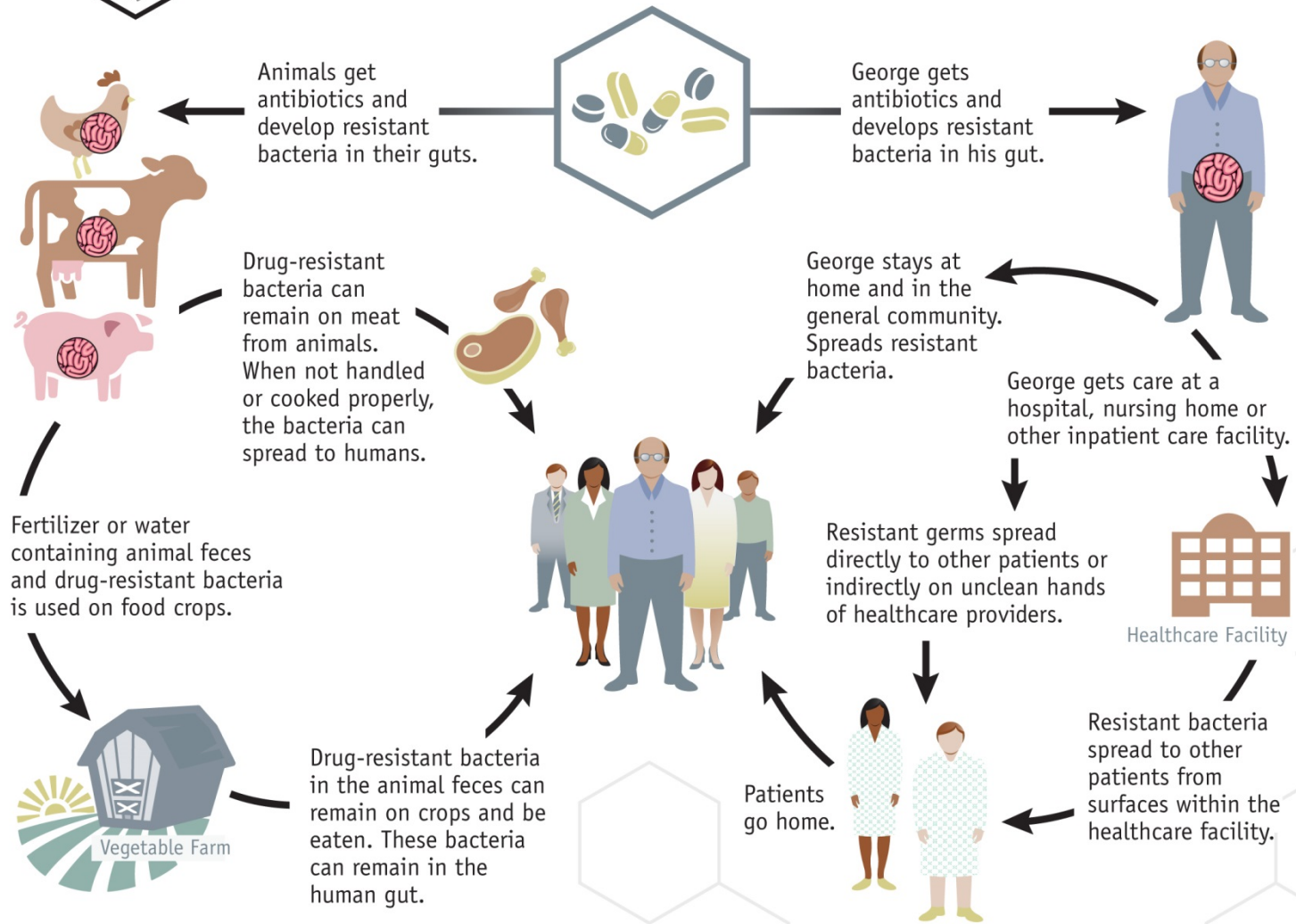
THREAT LEVEL
URGENT



\$1,000,000,000
IN EXCESS MEDICAL COSTS PER YEAR



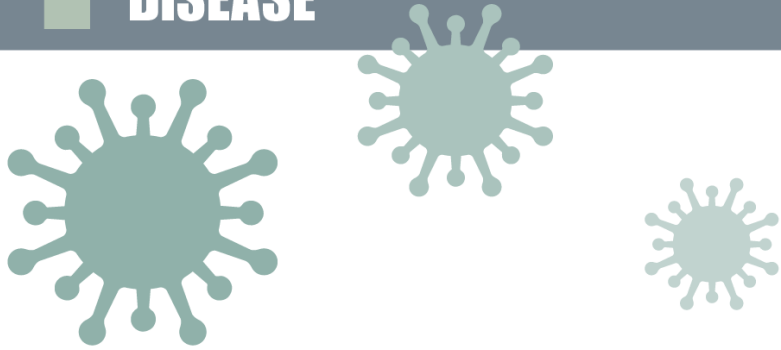
Examples of How Antibiotic Resistance Spreads



Simply using antibiotics creates resistance. These drugs should only be used to treat infections.

Fighting back against antibiotic resistance

1 PREVENTING INFECTIONS, PREVENTING THE SPREAD OF DISEASE



2 TRACKING



3 IMPROVING ANTIBIOTIC PRESCRIBING AND USE, AKA "STEWARDSHIP"



4 DEVELOPING NEW DRUGS





NATIONAL ACTION
PLAN FOR COMBATING
ANTIBIOTIC-RESISTANT
BACTERIA

MARCH 2015

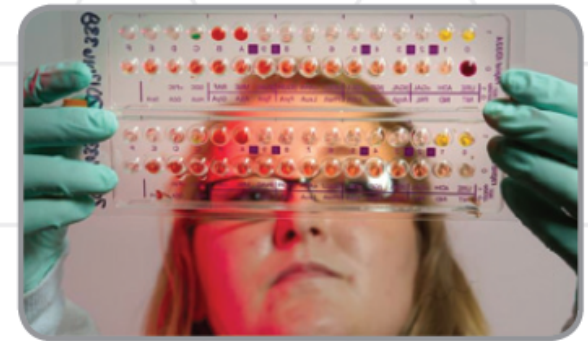




Stop Spread; Protect People

Action in every state

- ▶ **Establish State AR Prevention Programs (“Protect Programs”)**, groups of healthcare facilities in communities around the country that work together to better track outbreaks, improve prescribing, and prevent infections
- ▶ **Detect and respond rapidly to reduce spread** of multidrug-resistant gonorrhea (GC) and better treatment of GC
- ▶ **Identify critical new interventions** against multidrug-resistant tuberculosis (TB) and expand pre-migration TB screening beyond immigrants and refugees
- ▶ **Support development of next generation rapid susceptibility tests** for drug-resistant pathogens
- ▶ **Identify new ways to prevent human infections caused by resistant bacteria** (such as *Salmonella*) from food animals using the National Antimicrobial Resistance Monitoring System (NARMS)





Track Superbugs; Measure Impact

Accelerate outbreak detection and prevention innovation

- ▶ **New Detect Network of AR Regional Labs** to improve response to outbreaks of urgent, serious, or concerning threats; know faster which antibiotics work; and use cutting edge methods to track and get ahead of spread
- ▶ **New AR Isolate Bank** to provide a complete collection of current resistant threats; help keep pace with mutations; and provide information for FDA-approval of products and for companies/researchers' new tests and antibiotics
- ▶ **Measure impact of antibiotics on human microbiome** to learn if a healthy microbiome protects people and to learn if antibiotics given to infants and elderly lead to health problems or higher risk of drug-resistant infection
- ▶ **Double number of CDC's Emerging Infections Program (EIP) sites** to expand tracking to urgent and serious threats; track evolving AR threats better; and improve understanding of who is at risk
- ▶ **Enhance global partnerships** for prevention and detection to combat AR internationally

Alerting other facilities when transferring a patient reduces spread of resistant infections between facilities.

Patients are transferred between healthcare facilities.



CRE



Acute Care Hospitals



State Departments of Public Health will use AR data to target hot spots and outbreaks, enhance communication for patient transfer, and improve infection control and prevention across communities.

State Department of Public Health

AR Lab Network

Facilities send isolates to the AR Lab Network, which serves as a resource to help identify outbreaks.

CDC



Long-term Acute Care Hospitals



Nursing Homes

CDC guidelines drive prevention of infections.
CDC data tracks prevention gaps and progress.
CDC provides gold-standard laboratory methods to detect antibiotic resistance.



AR: antibiotic resistance
MDR: multi-drug resistance



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

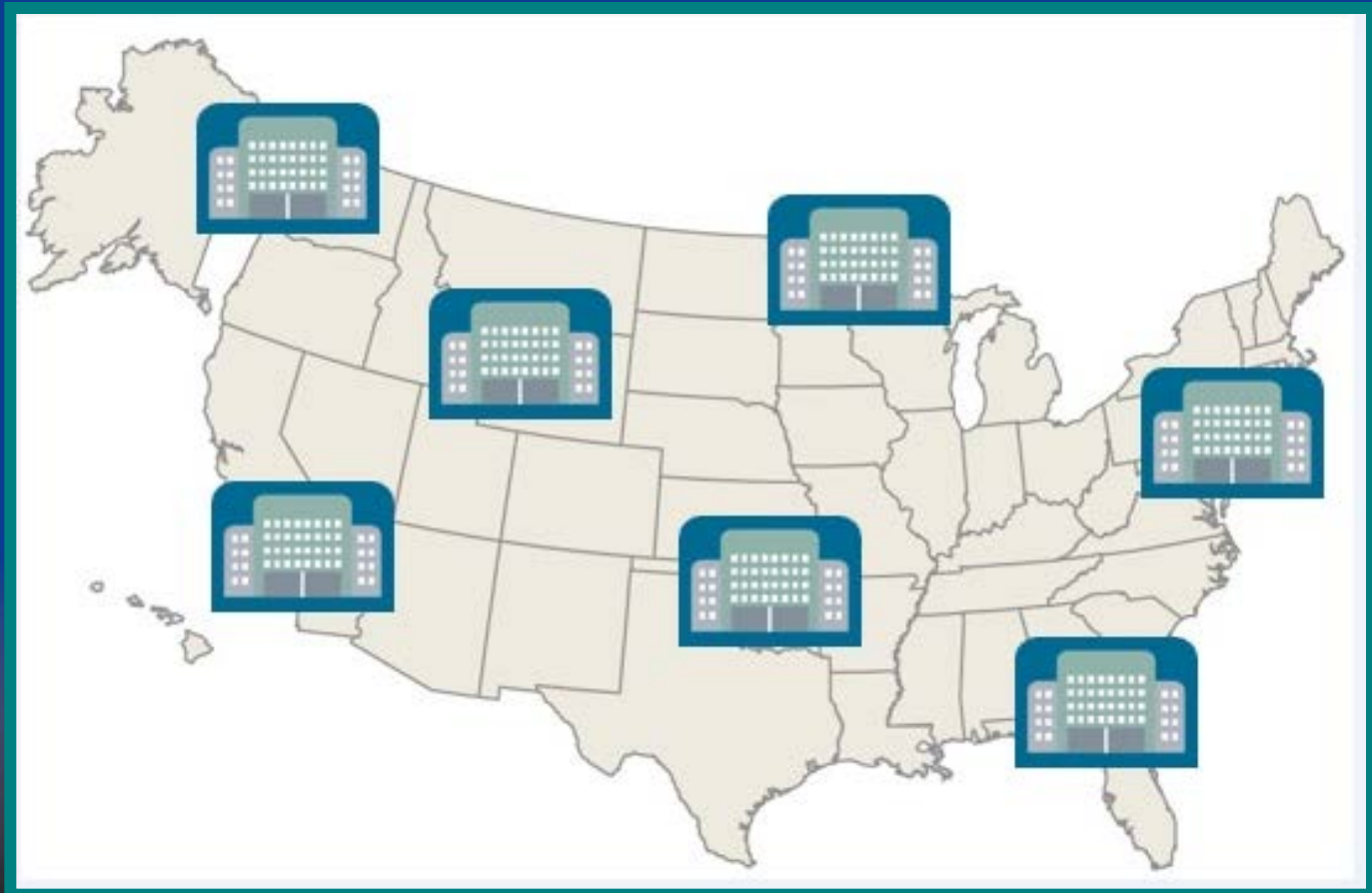


Improve Antibiotic Use





The AR Laboratory Network





A Regional Laboratory Network

- Funding for 7 regional labs was proposed in the FY16 Presidential Budget
- Labs will do testing that fills the gap between data generated in hospitals and data needed for public health action (i.e., data needed to respond and prevent AR infections).
- Labs will help to support state prevention programs



An Example Scenario

- An increase in carbapenem-R *Pseudomonas aeruginosa* (CRPA) infections is identified in a hospital.
- CDC is reporting the emergence of CRPA isolates in the U.S.
- To prevent infections, the medical professionals needs to know:
 - Do the CRPA produce a carbapenemase?
 - Are the CRPA isolates related?
 - Can a common source be identified?



Gaps in AR Data

- Identification of resistance mechanisms
- Most hospitals do not do this testing because it is not needed for patient-level decisions and it is not reimbursed.
- Scenario: 30 isolates were sent to a regional lab where testing confirmed carbapenem resistance and identified NDM production (i.e., carbapenemase production) in 10 isolates.



Gaps in AR Data

- Molecular typing of MDRO pathogens to identify outbreaks or to characterize ongoing transmission dynamics
- Most hospitals do not do this testing because it is not needed for patient-level decisions and it is not reimbursed.
- Scenario: Sequencing technologies were applied for isolate characterization and 8 of the 10 NDM-producing isolates were nearly genetically identical indicating an outbreak.



Gaps in AR Data

- Tests to identify patients colonized with a AR pathogens
- Most hospital labs don't do this because there are no FDA-approved tests and therefore, no reimbursement.
- Scenario: Within a hospital, healthcare providers want to know where infection prevention efforts will be most effective.

Resistant Enteric Infections



Enteric Pathogens

- Proposal to test 100% of isolates for antimicrobial resistance



How will CDC's Initiative fight foodborne infections?



Find outbreaks faster by increasing lab testing

Reduce multidrug-resistant *Salmonella* by 25%. Check **every** *Salmonella* isolate and more *Campylobacter* isolates from sick people for resistance in real time.



Detect and describe resistant pathogens rapidly

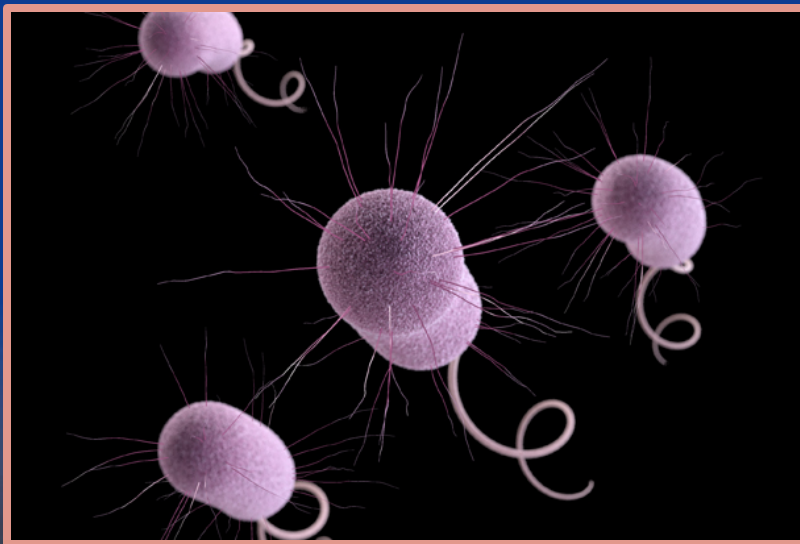
Decrease by 50% the time needed for the National Antimicrobial Resistance Monitoring System (NARMS) to report the results of resistance testing to the states.

Resistant Gonorrhea Infections



Enhanced Surveillance

- Expand surveillance via existing network.



Rapidly detect resistant gonorrhea

- Expand the availability of resistance testing to better treat patients
- Reduce time needed to get test results to healthcare providers



Effective treatment



- Use test results to choose correct antibiotics for patients
- Prevent health complications and stop spread with appropriate treatment



Public health action

- Alert patients and local health departments of a resistant strain quickly
- Identify and contact sexual partners faster to limit spread of resistant strains



Increase monitoring and awareness

- Alert healthcare professionals and communities about resistant strains
- Find hot spots
- Predict potential outbreaks



A Summary of Some Testing Capabilities

- Antimicrobial susceptibility testing to confirm resistance
- Tests to identify resistance mechanisms
- AMD tests to characterize outbreaks and transmission dynamics
- Tests to identify patients colonized with AR pathogens
- Culture to isolate *Clostridium difficile**

***Testing capability may not be needed in all 5 labs**



Other Desired Laboratory Capabilities

- An ability to report results to the submitter in a timely manner
- An ability to report results to the public health department of the submitter's state in a timely manner
- An ability to share data with CDC in a timely manner



The Isolate Repository and Sequence Database

- The Lab Network will collect and characterize AR pathogens for prevention efforts.
- Other benefits of this work:
 - Creating a repository of AR pathogens for challenging new diagnostic devices and development of new drugs
 - Creating a database of sequences of AR pathogens to promote research efforts





Thank You

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