CDC Plans to Battle Antimicrobial Resistance

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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

THREAT LEVEL: URGENT

- 9,000 drug-resistant infections per year
- 600 deaths
- CRE have become resistant to all or nearly all available antibiotics

DRUG-RESISTANT NEISSERIA GONORRHOEAE

THREAT LEVEL: URGENT

- 246,000 drug-resistant gonorrhea infections
- 820,000 gonococcal infections per year

CLOSTRIDIUM DIFFICILE

THREAT LEVEL: URGENT

- 250,000 infections per year
- 14,000 deaths
- $1,000,000,000 in excess medical costs per year
Examples of How Antibiotic Resistance Spreads

Animals get antibiotics and develop resistant bacteria in their guts.

Drug-resistant bacteria can remain on meat from animals. When not handled or cooked properly, the bacteria can spread to humans.

Fertilizer or water containing animal feces and drug-resistant bacteria is used on food crops.

Drug-resistant bacteria in the animal feces can remain on crops and be eaten. These bacteria can remain in the human gut.

George gets antibiotics and develops resistant bacteria in his gut.

George stays at home and in the general community. Spreads resistant bacteria.

George gets care at a hospital, nursing home or other inpatient care facility.

Resistant germs spread directly to other patients or indirectly on unclean hands of healthcare providers.

Patients go home.

Resistant bacteria spread to other patients from surfaces within the healthcare facility.

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

THE WHITE HOUSE
WASHINGTON, D.C.
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.

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.

AR Lab Network

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

CDC

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

Long-term Acute Care Hospitals

Nursing Homes

AR: antibiotic resistance
MDR: multi-drug resistance
Improve Antibiotic Use

**In Doctors’ Offices**

- Provide real-time data about antibiotic use and trends to better understand prescribing practices
- Set national standards of antibiotic use to improve use and reduce resistance
- Understand and act upon differences in antibiotic prescribing rates by state
- Evaluate interventions, such as electronic decision support systems, to improve clinician antibiotic prescribing
- Help health departments create regional programs to improve antibiotic prescribing in the community
- Cut inappropriate prescribing practices by 50%

**In Hospitals**

- Provide real-time data about antibiotic use and trends using CDC’s National Healthcare Safety Network (NHSN)
- Set national standards of antibiotic use to improve use and reduce resistance
- Ensure all hospitals have effective stewardship programs
- Support networks that are testing new prescribing improvement strategies
- Help hospitals and health departments create regional programs to improve antibiotic prescribing in hospitals
- Cut inappropriate prescribing practices by 20%
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 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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