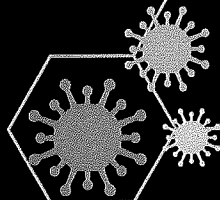


FIGHTING BACK AGAINST ANTIBIOTIC RESISTANCE

Four Core Actions to Prevent Antibiotic Resistance

1 PREVENTING INFECTIONS, PREVENTING THE SPREAD OF RESISTANCE



Avoiding infections in the first place reduces the amount of antibiotics that have to be used and reduces the likelihood that resistance will develop during therapy. There are many ways that drug-resistant infections can be prevented: immunization, safe food preparation, handwashing, and using antibiotics as directed and only when necessary. In addition, preventing infections also prevents the spread of resistant bacteria.

2 TRACKING



CDC gathers data on antibiotic-resistant infections, causes of infections and whether there are particular reasons (risk factors) that caused some people to get a resistant infection. With that information, experts can develop specific strategies to prevent those infections and prevent the resistant bacteria from spreading.

3 IMPROVING ANTIBIOTIC PRESCRIBING/STEWARDSHIP



Perhaps the single most important action needed to greatly slow down the development and spread of antibiotic-resistant infections is to change the way antibiotics are used. Up to half of antibiotic use in humans and much of antibiotic use in animals is unnecessary and inappropriate and makes everyone less safe. Stopping even some of the inappropriate and unnecessary use of antibiotics in people and animals would help greatly in slowing down the spread of resistant bacteria. This commitment to always use antibiotics appropriately and safely—only when they are needed to treat disease, and to choose the right antibiotics and to administer them in the right way in every case—is known as antibiotic stewardship.

4 DEVELOPING NEW DRUGS AND DIAGNOSTIC TESTS



Because antibiotic resistance occurs as part of a natural process in which bacteria evolve, it can be slowed but not stopped. Therefore, we will always need new antibiotics to keep up with resistant bacteria as well as new diagnostic tests to track the development of resistance.



GAPS IN KNOWLEDGE OF ANTIBIOTIC RESISTANCE

LIMITED NATIONAL, STATE, AND FEDERAL CAPACITY TO DETECT AND RESPOND TO URGENT AND EMERGING ANTIBIOTIC RESISTANCE THREATS



Even for critical pathogens of concern like carbapenem-resistant Enterobacteriaceae (CRE) and *Neisseria gonorrhoeae*, we do not have a complete picture of the domestic incidence, prevalence, mortality, and cost of resistance.

CURRENTLY, THERE IS NO SYSTEMATIC INTERNATIONAL SURVEILLANCE OF ANTIBIOTIC RESISTANCE THREATS



Today, the international identification of antibiotic resistance threats occurs through domestic importation of novel antibiotic resistance threats or through identification of overseas outbreaks.

DATA ON ANTIBIOTIC USE IN HUMAN HEALTHCARE AND IN AGRICULTURE ARE NOT SYSTEMATICALLY COLLECTED



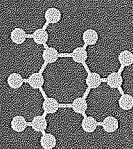
Routine systems of reporting and benchmarking antibiotic use wherever it occurs need to be piloted and scaled nationwide.

PROGRAMS TO IMPROVE ANTIBIOTIC PRESCRIBING ARE NOT WIDELY USED IN THE UNITED STATES



These inpatient and outpatient programs hold great promise for reducing antibiotic resistance threats, improving patient outcomes, and saving healthcare dollars.

ADVANCED TECHNOLOGIES CAN IDENTIFY THREATS MUCH FASTER THAN CURRENT PRACTICE



Advanced molecular detection (AMD) technologies, which can identify AR threats much faster than current practice, are not being used as widely as necessary in the United States.



CLOSTRIDIUM DIFFICILE



THREAT LEVEL **URGENT**

This bacteria is an immediate public health threat that requires urgent and aggressive action.



250,000
INFECTIONS PER YEAR



14,000
DEATHS



\$1,000,000,000

IN EXCESS MEDICAL COSTS PER YEAR



Clostridium difficile (*C. difficile*) causes life-threatening diarrhea. These infections mostly occur in people who have had both recent medical care and antibiotics. Often, *C. difficile* infections occur in hospitalized or recently hospitalized patients.

RESISTANCE OF CONCERN

- Although resistance to the antibiotics used to treat *C. difficile* infections is not yet a problem, the bacteria spreads rapidly because it is naturally resistant to many drugs used to treat other infections.
- In 2000, a stronger strain of the bacteria emerged. This strain is resistant to fluoroquinolone antibiotics, which are commonly used to treat other infections.
- This strain has spread throughout North America and Europe, infecting and killing more people wherever it spreads.

PUBLIC HEALTH THREAT

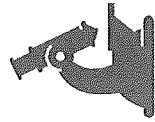
- 250,000 infections per year requiring hospitalization or affecting already hospitalized patients.
- 14,000 deaths per year.
- At least \$1 billion in excess medical costs per year.
- Deaths related to *C. difficile* increased 400% between 2000 and 2007, in part because of a stronger bacteria strain that emerged.
- Almost half of infections occur in people younger than 65, but more than 90% of deaths occur in people 65 and older.
- About half of *C. difficile* infections first show symptoms in hospitalized or recently hospitalized patients, and half first show symptoms in nursing home patients or in people recently cared for in doctors' offices and clinics.



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FIGHTING THE SPREAD OF RESISTANCE

WHAT CDC IS DOING



- Tracking and reporting national progress toward preventing *C. difficile* infections.
- Promoting *C. difficile* prevention programs and providing gold-standard patient safety recommendations.
- Providing prevention expertise, as well as outbreak and laboratory assistance, to health departments and healthcare facilities.

WHAT YOU CAN DO

CEOs, Medical Officers, and other Healthcare Facility Leaders Can:



- Support better testing (nucleic acid amplification tests), tracking, and reporting of infections and prevention efforts.
- Ensure policies for rapid detection and isolation of patients with *C. difficile* are in place and followed.
- Assess hospital cleaning to be sure it is performed thoroughly, and augment this using an Environmental Protection Agency-approved, spore-killing disinfectant in rooms where *C. difficile* patients are treated.
- Notify other healthcare facilities about infectious diseases when patients transfer, especially between hospitals and nursing homes.
- Participate in a regional *C. difficile* prevention effort.

Healthcare Providers Can:

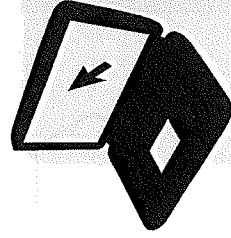


- Prescribe antibiotics carefully (see <http://www.cdc.gov/getsmart/specific-groups/hcp/index.html>). Once culture results are available, check whether the prescribed antibiotics are correct and necessary.
- Order a *C. difficile* test (preferably a nucleic acid amplification test) if the patient has had 3 or more unformed stools within 24 hours.
- Be aware of infection rates in your facility or practice, and follow infection control recommendations with every patient. This includes using contact precautions (gloves and gowns) and isolation for patients who are suspected to have *C. difficile*, and continuing those practices for those with positive test results.

Patients can:



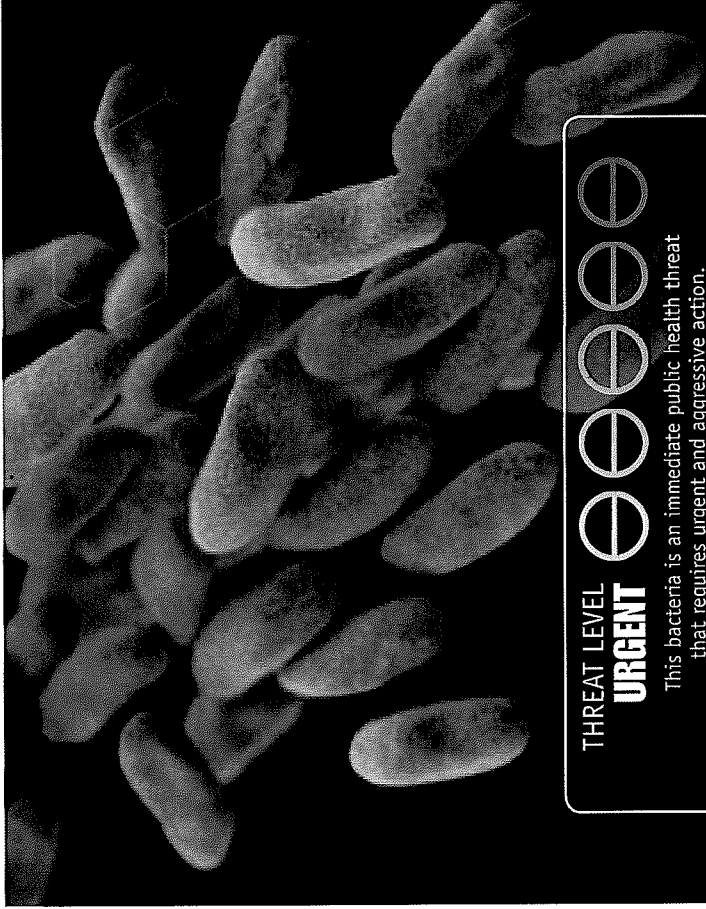
- Take antibiotics only as prescribed by your doctor and complete the prescribed course of treatment. Antibiotics can be lifesaving medicines.
- Tell your doctor if you have been on antibiotics and get diarrhea within a few months.
- Wash your hands before eating and after using the bathroom.
- Try to use a separate bathroom if you have diarrhea, or be sure the bathroom is cleaned well if someone with diarrhea has used it.



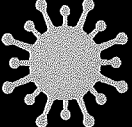
ONLINE RESOURCES

Vital Signs, March 2012: Making Health Care Safer
<http://www.cdc.gov/vitalsigns/hai/>

Clostridium difficile Infection resources
http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html



CARBAPENEM-RESISTANT ENTEROBACTERIACEAE


9,000 DRUG-RESISTANT INFECTIONS PER YEAR
 
600 DEATHS

CARBAPENEM-RESISTANT *KLEBSIELLA* SPP. **7,900**

1,400

 CARBAPENEM-RESISTANT *E. COLI*


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


THREAT LEVEL **URGENT**

This bacteria is an immediate public health threat that requires urgent and aggressive action.

Untreatable and hard-to-treat infections from carbapenem-resistant Enterobacteriaceae (CRE) bacteria are on the rise among patients in medical facilities. CRE have become resistant to all or nearly all the antibiotics we have today. Almost half of hospital patients who get bloodstream infections from CRE bacteria die from the infection.

RESISTANCE OF CONCERN

- Some Enterobacteriaceae are resistant to nearly all antibiotics, including carbapenems, which are often considered the antibiotics of last resort.
- More than 9,000 healthcare-associated infections are caused by CRE each year.
- CDC laboratories have confirmed at least one type of CRE in healthcare facilities in 44 states.
- About 4% of U.S. short-stay hospitals had at least one patient with a serious CRE infection during the first half of 2012. About 18% of long-term acute care hospitals had one.

PUBLIC HEALTH THREAT

An estimated 140,000 healthcare-associated Enterobacteriaceae infections occur in the United States each year; about 9,300 of these are caused by CRE. Up to half of all bloodstream infections caused by CRE result in death. Fortunately, bloodstream infections account for a minority of all healthcare-associated infections caused by Enterobacteriaceae. Each year, approximately 600 deaths result from infections caused by the two most common types of CRE, carbapenem-resistant *Klebsiella* spp. and carbapenem-resistant *E. coli*.

	Percentage of Enterobacteriaceae healthcare-associated infections resistant to carbapenems	Estimated number of infections	Estimated number of deaths attributed
Carbapenem-Resistant <i>Klebsiella</i> spp.	11%	7,900	520
Carbapenem-resistant <i>E. coli</i>	2%	1,400	90

For more information about data methods and references, please see technical appendix.



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CARBAPENEM-RESISTANT ENTEROBACTERIACEAE

FIGHTING THE SPREAD OF RESISTANCE

WHAT CDC IS DOING

- ▣ Tracking illness and identifying risk factors for CRE infections using two systems, the National Healthcare Safety Network and the Emerging Infections Program.
- ▣ Providing CRE outbreak support, such as staff expertise, prevention guidelines, tools, and lab assistance, to states and facilities.
- ▣ Developing tests and prevention programs to identify and control CRE. CDC's "Detect and Protect" effort (http://www.cdc.gov/hai/pdfs/cre/CDC_DetectProtect.pdf) supports regional CRE programs.
- ▣ Helping medical facilities improve antibiotic prescribing practices.

Health Care Providers Can:

- ▣ Know if patients with CRE are hospitalized at your facility, and stay aware of CRE infection risks. Ask if your patients have received medical care somewhere else, including another country.
- ▣ Follow infection control recommendations with every patient, using contact precautions for patients with CRE. Whenever possible, dedicate rooms, equipment, and staff to CRE patients.
- ▣ Prescribe antibiotics wisely (<http://www.cdc.gov/getsmart/healthcare>). Use culture results to modify prescriptions if needed.
- ▣ Remove temporary medical devices as soon as possible.

WHAT YOU CAN DO

States and Communities Can:

- ▣ Know CRE trends in your region.
- ▣ Coordinate regional CRE tracking and control efforts in areas with CRE. Areas not yet or rarely affected by CRE infections can be proactive in CRE prevention efforts.
- ▣ Require facilities to alert each other when transferring patients with any infection.
- ▣ Consider including CRE infections on your state's Notifiable Diseases list.

Healthcare CEOs, Medical Officers, and Other Healthcare Facility Leaders Can:

- ▣ Require and strictly enforce CDC guidance for CRE detection, prevention, tracking, and reporting.
- ▣ Make sure your lab can accurately identify CRE and alert clinical and infection prevention staff when these bacteria are present.
- ▣ Know CRE trends in your facility and in the facilities around you.
- ▣ When transferring a patient, require staff to notify the other facility about infections, including CRE.
- ▣ Join or start regional CRE prevention efforts, and promote wise antibiotic use.

Patients Can:

- ▣ Tell your doctor if you have been hospitalized in another facility or country.
- ▣ Take antibiotics only as prescribed.
- ▣ Insist that everyone wash their hands before touching you.

ONLINE RESOURCES

Vital Signs, March 2013: Making Health Care Safer

2012 CRE Toolkit

<http://www.cdc.gov/hai/organisms/cre/cre-toolkit/index.html>

MMWR, March 2013

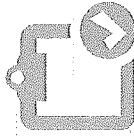
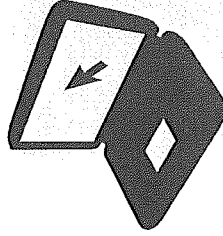
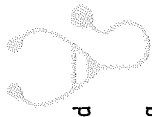
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6209a3.htm?s_cid=mm6209a3_w

Get Smart for Healthcare

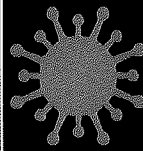
<http://www.cdc.gov/getsmart/healthcare>

Carbapenem-resistant Enterobacteriaceae (CRE) Resources

<http://www.cdc.gov/HAI/organisms/cre/index.html>

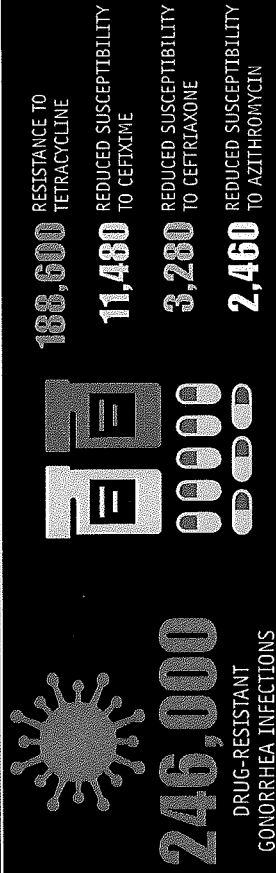


DRUG-RESISTANT NEISSERIA GONORRHOEA



THREAT LEVEL URGENT

This bacteria is an immediate public health threat that requires urgent and aggressive action.



Neisseria gonorrhoeae causes gonorrhea, a sexually transmitted disease that can result in discharge and inflammation at the urethra, cervix, pharynx, or rectum.

RESISTANCE OF CONCERN

N. gonorrhoeae is showing resistance to antibiotics usually used to treat it. These drugs include:

- ▣ cefixime (an oral cephalosporin)
- ▣ ceftriaxone (an injectable cephalosporin)
- ▣ azithromycin
- ▣ tetracycline

PUBLIC HEALTH THREAT

Gonorrhea is the second most commonly reported notifiable infection in the United States and is easily transmitted. It causes severe reproductive complications and disproportionately affects sexual, racial, and ethnic minorities. Gonorrhea control relies on prompt identification and treatment of infected persons and their sex partners. Because some drugs are less effective in treating gonorrhea, CDC recently updated its treatment guidelines to slow the emergence of drug resistance. CDC now recommends only ceftriaxone

plus either azithromycin or doxycycline as first-line treatment for gonorrhea. The emergence of cephalosporin resistance, especially ceftriaxone resistance, would greatly limit treatment options and could cripple gonorrhea control efforts.

In 2011, 321,849 cases of gonorrhea were reported to CDC, but CDC estimates that more than 800,000 cases occur annually in the United States.

	Percentage	Estimated number of cases
Gonorrhea		820,000
Resistance to any antibiotic	30%	246,000
Reduced susceptibility to cefixime	<1%	11,480
Reduced susceptibility to ceftriaxone	<1%	3,280
Reduced susceptibility to azithromycin	<1%	2,460
Resistance to tetracycline	23%	188,600

Source: The Gonococcal Isolate Surveillance Project (GISP)—5,900 isolates tested for susceptibility in 2011. For more information about data methods and references, please see technical appendix.



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