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A Return to the Pre-Antibiotic Era

Antimicrobial resistance is a catastrophic threat to the health of our nation. The Centers for Disease Control and Prevention (CDC) report that **every year in the United States, more than 2 million illnesses and 23,000 deaths occur due to antibiotic-resistant infections.** In addition, nearly 250,000 people are hospitalized and 14,000 people die from *Clostridium difficile* (*C. difficile*), an infection typically resulting from exposure to antibiotics. Infections caused by resistant microorganisms often fail to respond to standard treatment, resulting in prolonged illness and greater risk of death. They also increase healthcare costs and the economic burden to families and societies by requiring the use of stronger and more expensive drugs, extending hospital stays, and necessitating additional doctor visits and healthcare use. Moreover, patients infected with resistant microorganisms remain infectious for a longer period of time, increasing the risk of spreading these strains to others. These microorganisms have the potential to not only impact local communities, but to spread rapidly to distant countries and continents through global trade and travel. Thus, we must take responsibility for combating antibiotic resistance before many infectious diseases become untreatable or uncontrollable. Without urgent and aggressive action, many life-saving antibiotics and medical advances will be lost.

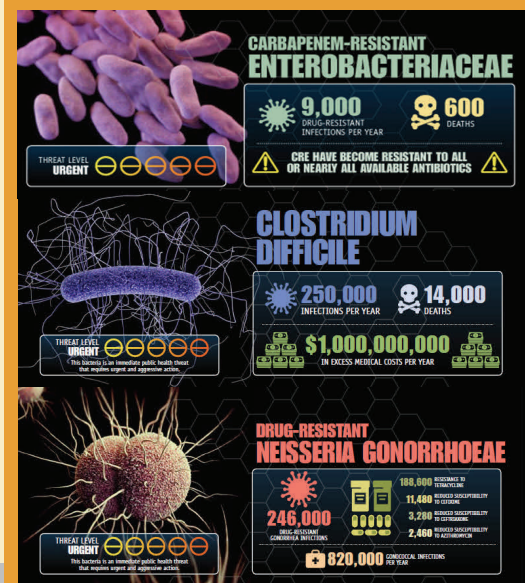
Four core actions have been identified by CDC to slow the development and spread of antibiotic-resistant infections: a focus towards infection prevention, surveillance, drug development, and antibiotic stewardship. Providers play an especially critical role in the latter element of antibiotic stewardship. While antibiotics are essential for preventing and treating disease, their overuse undoubtedly accelerates the threat of resistance. Studies suggest that nearly 50% of antibiotic use is unnecessary or inappropriate. As a result, healthcare professionals are increasingly adopting principles for appropriate antibiotic use, known as antibiotic stewardship. **Antibiotic stewardship is the commitment to always use antibiotics appropriately and safely.** Currently, there are no national or coordinated legislative or regulatory mandates to optimize use of antimicrobials through antimicrobial stewardship. However, given the societal value of these drugs, we encourage providers across all healthcare settings to promote antimicrobial stewardship by engaging in the following best practices for antimicrobial use:

- Ensure all orders are accompanied by dose, duration, and indication
- Order cultures prior to starting antibiotics to optimize drug regimens
- Take an “antibiotic timeout” to reassess therapy after 48-72 hours

In 2003, CDC launched *Get Smart*, a national campaign to promote the proper use of antibiotics in both outpatient and inpatient settings. *Get Smart* targets both patients and providers, and aims to optimize the use of antimicrobial agents through [health education and behavior change materials](#) and the [implementation of antimicrobial stewardship programs](#). Evidence suggests that employing effective prevention strategies and investing in antimicrobial stewardship programs reduces morbidity and mortality rates, improves individual patient outcomes, diminishes the overall burden of antibiotic resistance, and saves hundreds of thousands of dollars in healthcare costs.

In order to address the threat of antibiotic resistance, we need to change the way antibiotics are used. The CDC Director, Dr. Tom Frieden, warns, **“If we don’t act now, our medicine cabinet will be empty and we won’t have the antibiotics we need to save lives.”** We must gain a foothold in the battle against antibiotic resistance, and everyone—healthcare providers, hospital administrators, policy makers, and patients—must work together, so we can more effectively combat antibiotic resistance and ultimately save lives.

CDC conducted a domestic assessment of antibiotic resistance, and identified three bacteria as **urgent threats**. These are high-consequence antibiotic resistant threats, requiring urgent public health attention to identify infections and to limit transmission.



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CRE... The Nightmare Bacteria

Enterobacteriaceae are a family of gram negative bacteria that are a normal part of a person's healthy digestive system. However, once they enter other parts of the body, such as the bladder or bloodstream, these bacteria cause an estimated 140,000 healthcare-associated infections in the United States each year¹. Certain strains of Enterobacteriaceae have developed high levels of resistance to almost all antibiotics, even to last-resort antibiotics called carbapenems. These carbapenem-resistant Enterobacteriaceae, or CRE, were first identified fifteen years ago² and cause an estimated 9,300 infections and 600 deaths annually¹. The CDC has labeled CRE as an urgent threat that requires immediate and aggressive action. Without such action, these bacteria will continue to evade our best medical practices and render our antibiotics ineffective.

The two most common types of CRE are carbapenem-resistant *Klebsiella* spp. and *Escherichia coli*¹. Almost all CRE infections occur in patients that are receiving serious medical care, and up to half of all patients who acquire bloodstream infections from this bacteria die³. CRE can easily spread their antibiotic resistance to other bacteria, making these microbes potentially untreatable as well. Although CRE are not very common, their incidence has increased from 1% to 4% over the past decade³. About 4% of U.S. hospitals and 18% of long term acute care facilities reported having at least one patient with a CRE infection during the first half of 2012³. Laboratories at the CDC have also confirmed at least one type of CRE in forty-four states¹. At present, there are no specific prevalence estimates of CRE in Philadelphia; however, the northeastern region of the U.S. has been identified as an area where CRE infections are common³. The Philadelphia Department of Public Health (PDPH) has distributed a survey to the city's infection control practitioners in order to better understand the prevalence of CRE in Philadelphia⁴. The response to this survey is still in progress.

PDPH has recognized that there is a need for more CRE infection education and general infection control among healthcare facilities. There is also a need for increased communication between transfer facilities. Last fall, the multi-drug resistant organism (MDRO) initiative was created in response to Philadelphia's growing levels of antimicrobial resistance⁴. This initiative seeks to establish a multidisciplinary approach to addressing CRE within the region. Thus far, the initiative has developed an educational symposium through partnership with an advisory group, reviewed and disseminated a CRE checklist and inter-facility transfer form, and created a frequently asked questions sheet for patients. Longer term activities include the development of a Philadelphia area specific toolkit modeled in part after the CDC toolkit, as well as workgroups to further address clinical, laboratory, infection prevention, and educational needs. The initiative also recommends that healthcare facilities should promote wise antibiotic use and ensure that their laboratories can accurately identify CRE and be able to efficiently alert clinical and infection prevention staff.



TOP: Carbapenem-resistant Enterobacteriaceae (CRE).
BOTTOM: CDC staff showing two plates growing bacteria in the presence of discs containing various antibiotics. The isolate on the left plate is susceptible to the antibiotics on the discs, and is therefore, unable to grow around the discs. The one on the right has CRE that is resistant to all of the antibiotics tested and is able to grow near the disks.

To aid in the prevention and control of CRE, healthcare providers should:

- Ask patients if they have received medical care elsewhere, especially abroad
- Follow infection control recommendations with every patient
- Know if patients in your facility have CRE
 - ◊ Request immediate alerts when lab identifies CRE
 - ◊ Alert receiving facility when a patient with CRE transfers, and find out when a CRE patient transfers into your facility
 - ◊ Dedicate rooms, staff, and equipment to patients with CRE
- Remove temporary medical devices as soon as possible and limit the use of invasive devices
- Prescribe antibiotics wisely
- Report cases of CRE from a long term care facility or with a history of international medical care to PDPH

For more information, please visit <https://hip.phila.gov/xv/DiseaseInformation/CRE.aspx>

REPORT OUTBREAKS AND REPORTABLE DISEASES AND CONDITIONS TO PDPH

PHONE: (215) 685-6748

FAX: (215) 238-6947

Reporting requirements and forms are posted online
at <http://hip.phila.gov/xv>

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