

Antibiotic resistance in Minnesota (2013)

Antibiotic resistance is a critical public health, and patient care and safety issue. It is an ever-growing problem in Minnesota, as it is in the rest of the world. CDC released its report today that describes antimicrobial resistance accounting for 2 million infections and 23,000 deaths each year in the United States. In addition, illness caused by *C. difficile*, which is associated with antibiotic use, accounts for 250,000 hospitalizations and 14,000 deaths nationally.

- Our ability to control infections through the use of antibiotics has had a major impact in all clinical areas, but particularly in surgery, the care of premature babies, transplant medicine, oncology and intensive care medicine. The proportion of deaths from infections dropped dramatically because of the introduction of antibiotics.
- Unfortunately, bacteria exposed to antibiotics have evolved strategies to survive, in other words becoming resistant.
- Of critical importance are extremely drug-resistant Gram-negative bacteria, carbapenem resistant Enterobacteriaceae (CRE), which have spread widely in the U.S. In some cases, these bacteria have become pan-resistant, or resistant to all available antibiotics; essentially they are untreatable. Infections with these very dangerous bacteria have a much higher death rate attributed to the infection compared with infection from susceptible bacteria.
 - These infections have spread in hospitals and nursing homes in other parts of the country, and according to the CDC report, these bacteria have been reported from 44 states, including Minnesota. We have detected 93 case-isolates since 2009 containing the *Klebsiella pneumoniae* carbapenemase that confers broad resistance. Twelve deaths occurred in patients known to have these resistant infections. We also have identified 3 cases of infection with the New Delhi Metallo-beta-lactamase, another mechanism associated with multi-drug resistance.
- Invasive methicillin-resistant *S. aureus* (MRSA) infections in the United States are estimated to account for 80,000 infections and 11,000 deaths on a yearly basis. This includes infections in people with medical conditions who have frequent contact with healthcare, and infections occurring in previously healthy people in the community.
- In Minnesota, surveillance at 12 sentinel hospital laboratories found that all site-MRSA infections in community dwelling patients who did not have risk factors for hospital infections, increased more than 14-fold from 2000 to 2009.
- Pneumococcal resistance peaked in Minnesota in 2000 before the widespread use of the pediatric conjugate vaccine. Additional pneumococcal strains became more prevalent in the following years and by 2009, 17% of invasive cases were resistant to 3 or more antibiotic classes. In 2010, a new conjugate vaccine was licensed which covered additional strains and by 2012, 9% of invasive pneumococcal strains were resistant to 3 or more antibiotic classes.
- We also have had a case of extensively drug resistant tuberculosis (XDR-TB) in Minnesota. XDR-TB is extremely challenging and expensive to treat. In addition, over the past 5 years we have had 8 cases of multi-drug resistant tuberculosis (MDR-TB), which is defined as resistant to at least the two major first-line TB drugs (isoniazid and rifampin).
- CDC estimates that there are 246,000 cases of drug resistant gonorrhea. Long term effects of untreated gonorrhea include infertility. Also, the risk of spread of HIV is increased in someone with gonorrhea. We are very concerned about the development of cephalosporin-resistant gonorrhea and are participating in a CDC surveillance system for gonorrhea.
- A project looking at the four counties around St. Cloud found that there were 1442 new cases of *C. difficile* disease from 2009-2012 and 60% of these occurred in community dwellers without recent hospitalization. There were 23 deaths, including 6 in community cases.
- One quarter of *Campylobacter* isolates tested in 2012 were resistant to ciprofloxacin; the majority of resistant isolates are from travelers returning from foreign countries. We have tracked multidrug-resistance in *Salmonella* isolates, and have documented an increase in resistance to clinically important antibiotics (e.g., ceftriaxone).
- One third of Group B streptococcus isolates were resistant to clindamycin in 2012. Clindamycin is an alternative drug that is used in people with a severe penicillin allergy.

ANTIBIOTIC RESISTANCE IN MINNESOTA 2013

Resistance to antimicrobials is an urgent public health threat that needs to be addressed by all of us now. Unfortunately, life-threatening drug-resistant infections are increasing at the same time that the development and availability of new antibiotics is at an all-time low. Antimicrobial resistance is a problem for everyone and everyone needs to work on preserving these precious tools.

What can be done?

1. Use antibiotics only when needed, and use them correctly. CDC has found that up to half of the antibiotics used in this country are inappropriate. We need to be responsible stewards of antibiotics. This concept is called antimicrobial stewardship.
2. We need to incorporate infection prevention practices, such as meticulous hand-washing and other practices routinely into the care of patients so that we do not transmit resistant bacteria in the healthcare setting.
 - MDH has partnered with infection preventionists on efforts to control CRE, MRSA, *C. difficile*, surgical site infections and infections in long-term care facilities.
 - The appropriate use of vaccines will mitigate the need for treatment of certain infections; in fact, the use of the pneumococcal conjugate vaccine has significantly dropped the amount of resistant pneumococcal infections.
 - Safe food preparation will aid in diminishing foodborne disease, including resistant foodborne infections.
3. We need to continue to track infections and the proportion that are resistant, in order to target our efforts to control resistance. In Minnesota we have done this through the CDC-sponsored Emerging Infections Program in collaboration with infection preventionists, other clinicians and laboratorians in Minnesota. This system tracks invasive bacterial disease through the Active Bacterial Core Surveillance system and foodborne pathogens through FoodNet, and is a key system to maintain.
 - We have disseminated information on resistant infections through our yearly antibiogram since 1999.
4. We need to continue to encourage the research and development of new antibiotics.
 - Any antibiotic use will provide pressure for bacteria to develop resistance, so while we are preserving the tools we have today, we need to simultaneously work on the tools for tomorrow as it takes an average of ten years for a new antibiotic to move from the bench to the pharmacy.
5. We need to encourage the development of new technologies that can identify resistance in bacteria. As more laboratories are moving to culture independent diagnostic tests, we lose the ability to test for resistance using classical methods. In addition, new technologies that can more rapidly identify the etiology of an illness, can improve the use of antibiotics.
6. More information on what we are doing and on antimicrobial resistance can be found at: [Antimicrobial Resistance and Stewardship \(health.mn.gov/diseases/antibioticresistance/\)](http://health.mn.gov/diseases/antibioticresistance/)

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