The U.S. Centers for Disease Control and Prevention (CDC) has defined the antimicrobial resistance problem as a “major blooming public health crisis.”\(^1\) Drug resistant bacterial infections affect hundreds of thousands of Americans and cause tens of thousands of deaths each year. These infections are painful, difficult to treat, and this ‘silent epidemic’ costs the U.S. health care system many billions of dollars annually. And yet, an astoundingly diminutive amount of federal resources are being committed to address this staggering problem.

Antibiotic-resistant infections have become significant threats to citizens of PENNSYLVANIA:

**Drug-resistant *Staphylococcus aureus***:

- Although primarily affecting ill people in hospitals, Methicillin-resistant *Staphylococcus aureus* (MRSA), a drug-resistant bacteria, are infecting a growing number of people in the community and outside hospitals, including healthy athletes and children. A recent study in the *Journal of the American Medical Association* demonstrates that MRSA alone infects more than 94,000 people and kills nearly 19,000 annually in the United States – more deaths than those caused by emphysema, HIV/AIDS, Parkinson’s disease, and homicide.\(^2\)

- Hospitalizations for or complicated by MRSA infections cost nearly double that for non-MRSA stays – 14,000 for MRSA stays compared with $7,600 for non-MRSA stays. The average length of stay in the hospital for a patient with MRSA infection was more than double that for non-MRSA stays – 10.0 days versus 4.6 days.\(^3\)

**Drug-resistant “gram negative” bacterial infections:***

- Serious and life-threatening infections due to antibiotic resistant “gram negative” bacteria are on the rise across the United States. Gram negative bacteria primarily are differentiated from gram positive bacteria, like MRSA, by a cell wall that is particularly adept at preventing antibiotics from entering the bacteria. These infections, primarily acquired in hospitals and long term care settings, are extremely difficult to treat and cause significant numbers of illnesses and deaths. Bacteria in this group include: *Escherichia coli* (E. coli), *Klebsiella pneumonia*, *Pseudomonas aeruginosa*, and *Acinetobacter*.

- In March 2009, CDC published guidelines for detection and control of *E. coli* and *Klebsiella* species with increasing resistance to a subclass of antibacterial drugs known as carbapenems. Carbapenems are among the most potent antibiotics currently available and are often considered the “last line of defense” in the treatment of antibiotic resistant bacteria. Studies have shown that the mortality rate from infections caused by carbapenem resistant *Klebsiella* species is roughly

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\(^1\) Dr. Fred Tenover, quoted in “The Bacteria Fight Back” *Science*, July 18, 2008.


40%. CDC described this problem as “another in a series of worrisome public health developments regarding antimicrobial resistance among gram-negative bacteria [that] underscores the immediate need for aggressive detection and control strategies.”

- Noteworthy, these organisms are difficult to detect with the automated testing systems currently used in most hospital laboratories.

- Of critical importance, there are few to no approved antibacterial drugs currently available to treat many gram negative bacterial infections and few to no new drugs in the pipeline; drug discovery in this area is extremely difficult due to challenges in overcoming the gram negative bacteria’s cell wall.

Other antimicrobial resistance issues:

- *Clostridium difficile* (*C. diff.*) is spawning infections in hospitals in the U.S. and abroad that can lead to severe diarrhea, ruptured colons, perforated bowels, kidney failure, blood poisoning and death. It is a common cause of antibiotic-associated diarrhea, accounting for 15-25% of all episodes. CDC estimates there are 500,000 cases of *C. diff.* infection annually in the U.S., contributing to between 15,000 and 30,000 deaths. Elderly hospitalized patients are at especially high risk and mortality in these patients may exceed 10%. The disease is very difficult to treat and recurs in at least 20% of cases, even when treated appropriately. A new more virulent strain of this organism is spreading throughout the United States. Pittsburgh may have been one of the epicenters for the emergence of this organism. The University of Pittsburgh Medical Center reported 26 colectomies and 18 deaths due to this organism between 2001 and 2002.
  - Deaths from *C. diff.* have increased steadily in Pennsylvania over the past few years. There were 117 in 2001, 162 in 2002, 227 in 2003, 346 in 2004, and 467 in 2005.

- The Pennsylvania Department of Health recently received reports of four fluoroquinolone-resistant gonorrhea isolates in four men who have sex with men (MSM) and bi-sexual men. Three of these cases were reported in Allegheny County and the other case was reported in Mifflin County. Fluoroquinolone-resistant gonorrhea has also been reported in Philadelphia. Although this resistant infection has reached alarming rates nationally, it was first reported in Pennsylvania.

- Carbapenem-resistant *Klebsiella pneumoniae* (CRKP) is a serious and life-threatening multidrug-resistant bacteria that has recently emerged in Pennsylvania. *Klebsiella Pneumoniae Carbapenemase* (KPC) is the enzyme found in CRKP that is responsible for conferring resistance to all but a single very old and very toxic anti-infective agent. CDC is closely monitoring KPC, which is highly resistant to nearly all antimicrobial agents.

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4 CDC MMWR “Guidance for Control of Infections with Carbapenem-Resistant or Carbapenemase-Producing *Enterobacteriaceae* in Acute Care Facilities” March 20, 2009 / Vol. 58 / No. 10
6 CDC Wonder Death Certificate Data, cited in a July 28, 2008 communication to Senator Sherrod Brown
7 Pennsylvania Department Of Health, Health Advisory # 21, October 1, 2004

Updated December 28, 2009
The CDC has identified Pennsylvania as one of four states where KPC-containing organisms frequently occur. Like other multidrug resistant organisms, infections caused by CRKP are associated with increased morbidity and mortality, increased duration of hospitalization, and increased cost of care.

Public health laboratory capacity:

A key factor in Pennsylvania’s ability to detect, monitor and control antimicrobial resistance is its public health laboratory capacity. Across the nation, increasing cases of antimicrobial resistance are currently swamping the ability of each state's public health laboratory to keep pace. There has been limited funding in the past for antibiotic resistance education programs and surveillance, and even this limited funding is on the decrease. Approximately only half of state public health labs can provide some basic resistance testing. Like many states, Pennsylvania lacks the targeted technical ability to detect and characterize emerging resistance patterns in a range of pathogens. Additionally, the state laboratory does not have the capacity to monitor the spread of resistance across the Commonwealth or to even perform basic susceptibility testing so community-based physicians can make informed decisions when prescribing antibiotics.

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8 CDC data cited in a July 28, 2008 communication to Senator Sherrod Brown