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 IOWA:

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 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*.

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

  - Deaths from C. diff. have fluctuated in Iowa over the past few years. There were 8 in 2001, 12 in 2002, 10 in 2003, 32 in 2004, and 17 in 2005.

  - There were 2,664 hospital discharges in 2006 in Iowa that included C. diff. as a diagnosis, according to the Agency for Healthcare Research and Quality (AHRQ). The cost per C. diff. patient in a hospital is estimated by

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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
CDC to be at least $3,500, making the annual healthcare cost for *C. diff.* in Iowa more than $9.3 million.\(^7\)

- *Streptococcus pneumoniae* is a leading cause of ear infections, meningitis and pneumonia. According to the Iowa Antibiotic Resistance Surveillance Program, covering data over the 1999-2002 timeframe, the percentage of penicillin-resistant *Streptococcus pneumoniae* isolates in Iowa ranged from 21.1% to 27.2%, peaking in 2001. The percentage of erythromycin-resistant *Streptococcus pneumoniae* isolates in Iowa ranged from 23.2% to 28.5%, peaking in 2000.\(^8\)

- The percentage of vancomycin-resistant *Enterococcus* isolates in Iowa ranged from 13.1% to 18.2%, peaking in 2001. The percentage of erythromycin-resistant Group A *Streptococcus* isolates rose from 3.2% to 11.8% from 1999 to 2001.\(^9\)

Public health laboratory capacity:

A key factor in Iowa’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, Iowa lacks the targeted technical ability to detect and characterize emerging resistance patterns promptly in a range of pathogens. Therefore, such resistant organisms continue to spread unrecognized and unimpeded throughout the state.

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\(^9\) *ibid*