MARYLAND: A Summary of Select Antimicrobial Resistance Data

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 MARYLAND:

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

- Several hospital emergency departments in Maryland, including those of the three lower Eastern Shore facilities, are seeing an increasing number of patients with MRSA. MRSA also is being noticed in many institutions such as police academies, elementary schools and universities on the Eastern Shore, high schools, college athletic teams, and prisons.4

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

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4 “MRSA Revisited,” Critical Link, Maryland Department of Health and Mental Hygiene, Vol. 12, No. 7; July 2008
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 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.

  - Deaths from C. diff’ have increased steadily in Maryland over the past few years. There were 29 in 2001, 56 in 2002, 66 in 2003, 89 in 2004, and 124 in 2005.

  - There were 8,924 hospital discharges in 2006 in Maryland 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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5 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
CDC to be at least $3,500, making the annual healthcare cost for *C. diff.* in Maryland more than $31.2 million.\(^8\)

- Several acute general hospitals in Maryland have reported either outbreaks or cases due to *Acinetobacter* bacteria with high degrees of antibiotic resistance. The outbreaks have been serious, involving a total of several dozen inpatients. *Acinetobacter*, a group of small gram-negative bacteria, can cause pneumonia, bacteremia, wound infection, or urinary tract infection.\(^9\) In recent years, strains of *Acinetobacter* have been emerging that are resistant to nearly all known remedies, commonly known as multi-drug resistant (MDR). Treatment is limited to a very old and very toxic drug. There are no new drugs in clinical development designed to treat infections caused by these deadly bacteria.

Public health laboratory capacity:

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

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\(^9\) Clinical Alert, Maryland Department of Health and Mental Hygiene, Office of Health Care Quality, Vol. 2, No. 2; Summer 2003.

*Updated December 28, 2009*