



POLICY RESPONSES TO THE GROWING THREAT OF ANTIBIOTIC RESISTANCE

POLICY BRIEF 3

DECEMBER 2007

COUNTING MRSA CASES:
AN EVALUATION OF RECENT EVIDENCE

By now, almost everyone has heard of MRSA—variants of the ubiquitous “staph” bacteria with resistance to traditional antibiotics (see Box). For communities that have cancelled football games or closed schools, and for anyone who contracts MRSA (formally, methicillin-resistant *Staphylococcus aureus*), the bacteria are a big problem, but how serious is the problem nationally? Two recent studies—the newest from *Extending the Cure* researchers Eili Klein, David Smith and Ramanan Laxminarayan—report on recent data.

Klein and colleagues’ article, in the December issue of the journal *Emerging Infectious Diseases*, analyzes levels and trends in MRSA-related hospitalizations and deaths from 1999 through 2005.¹ Another paper, by researchers from the Centers for Disease Control and Prevention (CDC), was published earlier this year in the *Journal of the American Medical Association (JAMA)*.² That study gives a detailed snapshot of MRSA’s impacts in 2005. The two studies use different methods and data sources, but both depict a serious problem—one that Klein and colleagues say has gotten worse every year.

MRSA: A Growing Problem

Klein and colleagues found that MRSA infections treated in hospitals doubled nationwide between 1999 and 2005, from an estimated 127,000 to 278,000. They also found that MRSA represented a growing *proportion* of staph infections seen in hospitals each year—from 40 percent in 1999 to 60 percent in 2005.

MRSA infections can be difficult (and expensive) to treat, and are more deadly than staph infections that are curable with common antibiotics. But determining just how many people die from MRSA involves considerable judgment. Many people who die with a

BOX: What is MRSA?

Methicillin-resistant *Staphylococcus aureus*—MRSA—are variants of common “staph” bacteria that are resistant to penicillin and related antibiotics. Both MRSA and common staph are typically harmless: they can live on the skin or in a person’s nose without causing any health problems. When they enter broken skin through a cut or sore, however, they can infect the surrounding tissue and form boils, blisters, or pimples. Sometimes antibiotics are needed to treat them, but often they can just be cleaned out and left to heal. Staph infections can also be much more serious, especially when they invade the bloodstream—causing blood infections called septicemia or bacteremia—or proliferate in the lungs—causing pneumonia. Almost all of the serious cases occur among patients who become infected through exposure to staph bacteria in hospitals or other healthcare settings. The pathogens have easy access to patients’ internal organs during surgery, around catheters used to infuse intravenous drugs and fluids, and around urinary catheters. This can lead to serious MRSA infections—especially in patients who are weakened by illness or old age—which can be deadly.

MRSA infection enter the hospital because they have a life-threatening condition and are already advanced in age. Any infection is more perilous than it would be for a healthy, young person. In other words, they may have died even without MRSA.

This led Klein and his colleagues to create two estimates of deaths attributable to MRSA. First, they used stricter criteria, trying to limit the deaths to those who might have not otherwise died. With this definition, they found about 5,500 deaths per year

Figure 1: MRSA infections in the United States have increased from 1999-

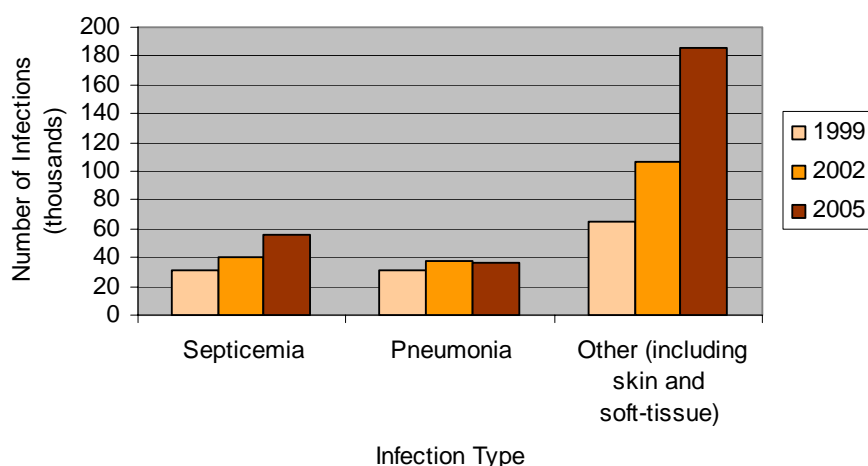
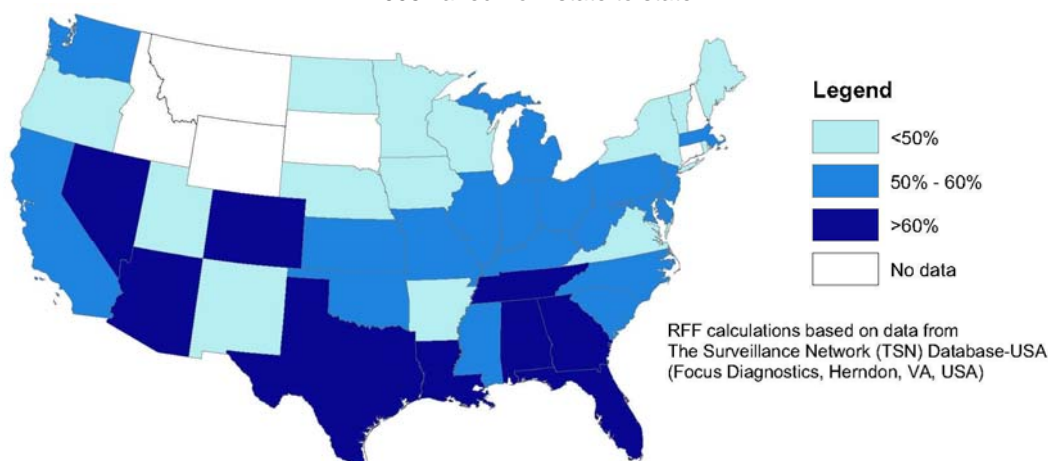


Figure 2: The percentage of staph infections that resulted from MRSA in 2005 varied from state to state.

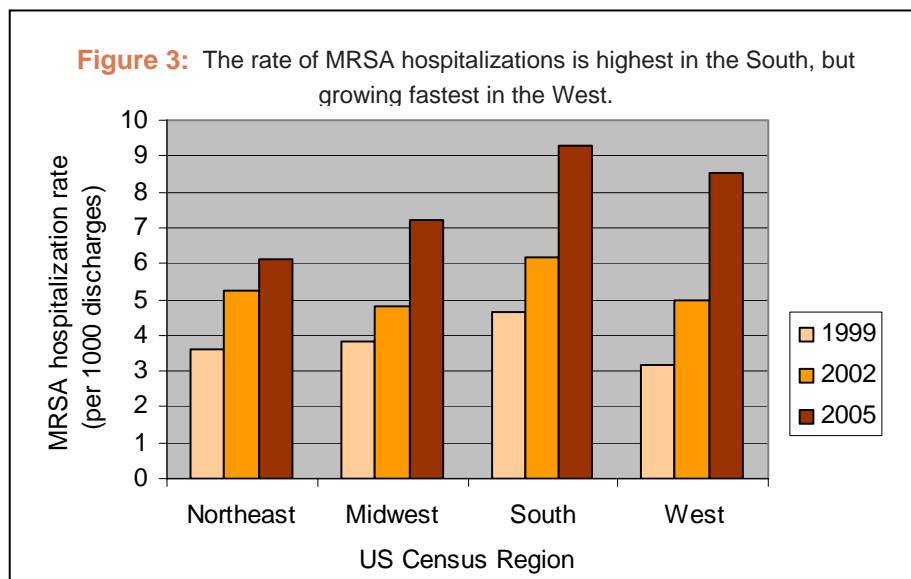


over the seven-year period, with no suggestion of a trend up or down. Using a more inclusive definition—everyone who died and had a documented case of MRSA during their hospitalization—the estimates were much higher and rose steadily. In 1999, about 11,000 such deaths were estimated, and by 2005, the number had grown to more than 17,000.

The increasing number of patients hospitalized with MRSA infections included both those typically acquired in hospitals (pneumonias and septicemias, the majority of infections classified as “invasive”) and those more likely to arise in the community (skin and soft-tissue infections, mainly “non-

invasive”). Septicemia cases increased 81 percent over seven years and pneumonias increased 19 percent. But by far the steepest increase was in skin and soft-tissue infections, which nearly tripled between 1999 and 2005 (see Figure 1). Most deaths from MRSA still result from infections that take root in hospitals (or other health care settings), but the community-associated MRSA burden is becoming increasingly important.

MRSA has reached every state by now, but the levels in 2005 (measured as the percentage of staph cases that are MRSA) vary considerably (see Figure 2). The rate of increase by region of the country is also variable. In 1999, the MRSA hospital discharge rates



were lowest in the West, but with almost double the rate of increase seen elsewhere, by 2005, the rate was higher than in the North and Midwest (see Figure 3).

In doing their analysis, Klein and colleagues combined information from two large databases, adapting an analytical method used in a study of MRSA in 1999 and 2000.³ From the National Hospital Discharge Survey (NHDS), they determined the number of people who were hospitalized with all types of staph infections. The NHDS, conducted since 1965 by the National Center for Health Statistics (part of CDC), includes data on about 270,000 inpatients each year in 500 hospitals around the country (about 1 percent of all inpatients). Because the antibiotic sensitivity of staph infections is not always reported in the NHDS, the RFF researchers used data from a second source, The Surveillance Network (TSN) of Focus Diagnostics, to find out what proportion of staph infections were drug resistant (that is, MRSA), matching each infection site and geographical area to those in the NHDS for each year of data. More than 300 laboratories that test bacteria for resistance report to TSN.

MRSA in 2005: A Bigger Problem than Expected

The study by CDC researchers Klevens and colleagues (in the October 17 issue of *JAMA*) made national news. The authors reported that the MRSA problem is larger than previously suspected: they estimated 94,000 invasive MRSA infections requiring hospitalization.² This is similar to the number found by Klein and colleagues, when skin and soft-tissue and “other” cases are excluded. Although the majority of cases—nearly three-quarters—arose outside of hospitals (referred to as “community-onset” cases), the CDC researchers were able to determine that most of the community-onset patients had recently been hospitalized or had been in other high-risk healthcare settings, the likely source of the bacteria. Still, about 14 percent of invasive MRSA cases seem to have become infected in the community, outside of any healthcare settings.

Klevens and colleagues estimate about 19,000 deaths from MRSA in 2005. Their definition—including all hospital deaths among those with a documented MRSA infection—is similar to the more inclusive one used by Klein and colleagues, and in fact, the two estimates are very close.

The data used by the CDC researchers came from the Active Bacterial Core surveillance (ABCs) under the Emerging Infections Program Network. ABCs is a CDC system to track a number of pathogens. MRSA data were available for just 18 months (July 2004-December 2005), so unlike Klein and colleagues, the CDC researchers could not report on trends. However, they had details on all hospitalized MRSA cases in nine urban areas around the country (covering 6 percent of the U.S. population).

Do the Studies Tell a Consistent Story?

The short answer is “yes.” The numbers from the two studies are somewhat different, but given the different data sources and analytical methods, it would be surprising if they were more similar. A study released earlier in 2007 by the Agency for Healthcare Research and Quality (part of the U.S. Department of Health and Human Services) using yet another national database, suggested an even higher number—almost 390,000—of MRSA hospitalizations in 2005.⁴ All the estimates are credible and all point to the same conclusion: MRSA is a big and growing problem in the United States.

MRSA Solutions

The problem of MRSA looms large, but it can be controlled. Simple hygiene measures such as hand washing can limit the transmission of MRSA in both healthcare and community settings. A number of other infection control measures are also effective. The most appropriate solution for each hospital depends on its specific situation. Some states already require surveillance and reporting of MRSA infections and a few have begun legislating infection control programs. Legislation has also been introduced at the national level to address these problems. Under the Deficit Reduction Act of 2005, Medicare reimbursement rules were changed to limit hospital payments for certain preventable healthcare-associated infections. The Community and

Healthcare-Associated Infections Reduction Act, introduced in October 2007 by Senator Durbin (D-IL), requires national reporting of hospital infection rates and research to better understand healthcare-associated and community-associated MRSA infections.

More studies like the ones profiled in this brief are also needed. Klein and colleagues took advantage of the NHDS (a general purpose survey) and TSN (data collected routinely for clinical use). The CDC researchers used data designed to provide a more detailed look at MRSA. Together, they begin to paint a picture of MRSA in the United States, but they also point out the need to continue tracking MRSA and to take measures to control its spread.

References

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