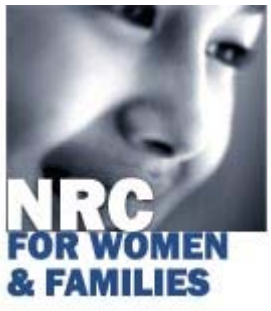

Issue Brief

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Antibiotic-Resistant Infections and MRSA

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Recently, a number of elementary and high school students across the United States have been diagnosed with *Methicillin-resistant Staphylococcus Aureus* (MRSA), a type of bacteria resistant to certain antibiotics. In the past, MRSA was more common in medical environments and nursing homes, but over the past few years the bacteria has started to appear in schools, gyms, and sports clubs. MRSA can spread easily in these environments through physical contact or sharing athletic clothing or equipment. The spread of MRSA into the larger community is a public health threat that scientists have been concerned about for years, because the bacteria is resistant to most antibiotics and very difficult to treat.

What is Staphylococcus Aureus (staph)?

Staphylococcus aureus, commonly referred to as "staph," are bacteria commonly found on the nose or skin. Approximately 20-30% of people commonly carry *staph aureus* but are not infected (CDC, 2007). *Staph aureus* bacteria are the most common causes of skin infections such as pimples and boils in the United States. They are usually harmless unless the organisms enter the bloodstream through a cut or wound, and can then sometimes cause an infection that can spread throughout the body. These serious infections include pneumonia, septicemia (a bloodstream infection) and surgical wound infections.

What is MRSA?

Methicillin-resistant Staphylococcus aureus (MRSA) is one type of *staph aureus* that has developed resistance to a family of antibiotics similar to penicillin. It is commonly carried on the nose and skin of healthy people, and is generally harmless until it enters the body through a cut or wound, where it may cause an infection. Although MRSA is resistant to many antibiotics, a handful of drugs can still be used to treat the infection. According to a recent report published in the *Journal of the American Medical Association*, about 94,000 people were infected with MRSA in 2005, and approximately 19,000 people died during a hospital stay related to the infection (Klevens et al., 2007). The U.S. Center for Disease Control and Prevention estimates that 1% of the population carries MRSA (CDC, 2007).

What Causes Antibiotic Resistance?

Since the discovery of penicillin in 1928, antibiotics and antimicrobial drugs have

been widely used in the United States. Over time, some bacteria have developed ways to survive these drugs. Unfortunately, the widespread use of antibiotics has contributed to the development of antibiotic-resistant bacteria.

When a person takes an antibiotic, the drug kills many bacteria, but a few will survive. These surviving bacteria are resistant to that antibiotic. They then multiply. This means that every time a patient takes an antibiotic, he or she is creating more drug-resistant bacteria.

Although bacterial antibiotic resistance is an evolutionary process, societal factors also contribute to the problem. The inappropriate use of antibiotics (such as treatment for viral infections like colds) contributes to the growing number of antibiotic-resistant bacteria today. For years, antibiotics have been prescribed for colds, earaches, flu, and other infections that normally clear up on their own. Inappropriate use of medications, such as not taking doses as prescribed, can also contribute to the emergence of antibiotic-resistant bacteria.

In recent years antibacterial household products have become popular, contributing to the increasing number of antibiotic-resistant bacteria. Antibacterial agents are commonly found in cleaners, soaps, detergents, hand lotions, tooth brushes, and sometimes even plastic containers and mattresses. Although people buy these products with the intent of protecting their family from harmful germs, the widespread use of antibacterial products helps to produce resistant bacteria.

Another cause for concern is the use of antibiotics in livestock (Mayo Clinic, 2007). Cows, chickens, and pigs are often fed low levels of antibiotics over long periods of time, and this is believed to promote the survival of antibacterial-resistant bacteria in livestock. There is some concern that these resistant bacteria can be transferred to humans through direct contact with animals or the consumption of their meat.

What Causes Infection?

Most *methicillin-resistant staph aureus* occurs as a result of exposure during medical care, usually after surgery or some procedure involving the insertion of foreign material into the body. The *staph aureus* or MRSA bacteria can enter the body through a cut, wound, or abrasion. An infection may result. *Staph* organisms are carried from person to person through human hands, especially in a healthcare environment.

What are the Symptoms?

Staph aureus infections, including MRSA, normally start as small bumps that resemble pimples or boils, and can be red, swollen, painful, or have pus or other drainage. Sometimes the infection is limited to the skin, but the bacteria can also burrow down into the body, and cause infections in the bones, joints, surgical wounds, the bloodstream, lungs, and heart valves. Symptoms for more serious infections would include fever, difficulty breathing, sweating, pallor, and rapid heart rate. If the valves of the heart are infected, symptoms may include chest pain or irregular heart beats. In some cases, excessive bleeding may occur.

Are Some People More Likely to Get an Infection?

Although anyone can get an infection, the elderly, men, and African Americans are more likely to get them (Klevens et al., 2007). The majority of MRSA infections

occur in hospitals or other healthcare settings, so people who have been hospitalized for a significant period of time are at greater risk (Klevens et al., 2007). Studies have also shown that living in crowded or unsanitary conditions also increases the risk of MRSA, and outbreaks have occurred in military training facilities and prisons (Mayo Clinic, 2007).

Now, many people are concerned about the risk of infection in schools. Infections are prone to spread from person to person in gyms and locker rooms through shared personal items like towels, razors, and athletic gear. Bacteria can also enter the body easily through cuts and abrasions sustained during team practice or sports games. However, as long as your child doesn't wear another person's personal items and washes his or her own frequently, the school environment is not likely to play a significant role in the transmission of the disease.

How Can I Prevent Infection?

The best way to prevent a *staph aureus* or MRSA infection is to practice good hygiene.

- Keep your hands clean by washing regularly with soap and water or using an alcohol-based hand sanitizer.
- Limit your use of antibacterial products in your home. Instead of using antibacterial cleaners, use an alcohol-based cleaner. Use soap instead of antibacterial hand wash.
- Keep cuts and wounds covered with a bandage until they are completely healed.
- Avoid contact with other people's wounds or bandages.
- Avoid sharing personal items such as towels, sheets, razors, clothing, and athletic equipment.
- Washing clothing and linens regularly with hot water and dry them in a hot dryer; wash athletic clothing after every use.
- Non-washable athletic equipment (e.g. head gear) should be wiped down with a phenol- or chlorine-based wipe such as liquid Lysol after each use.
- Avoid sharing lip balms, lotions, or any other cosmetics.
- Eat organic meat, which comes from livestock that have not ingested antibiotics.

Treatment

Although MSRA is resistant to most drugs, it can still respond to certain medications. Most doctors rely on intravenous vancomycin or other antibiotic drugs in its class (glycopeptide antibiotics) to treat resistant germs such as MRSA. Many less severe *staph aureus* skin infections can be treated by draining any abscesses or boils. This should only be done by a healthcare professional.

Concerns for the Future

The growing number of antibiotic-resistant bacteria poses a very serious threat to public health. In 1974, MRSA infections accounted for 2% of the total number of *staph aureus* infections; in 1995 it was 22%; in 2004 it was 63% (CDC, 2007). Fortunately, many antibacterial-resistant bacteria, such as MRSA, can still be treated with antibiotics.

Although not a new antibiotic, vancomycin has never been widely used because it usually must be given intravenously to be effective, and it has more side effects than many other antibiotics. Because of it's effectiveness for MRSA, it has become the antibiotic of last resort, and is used to treat

only the most serious, life-threatening infections. It should **not** be used unless other antibiotics have failed; otherwise, more bacteria will become resistant to vancomycin as well. In 2002, the CDC reported the first case of *staph aureus* infections resistant to vancomycin (NIAID, 2006). Since then, several more cases of vancomycin-resistant bacteria have been reported, leaving surgeons with *no* treatment options for patients infected with resistant strains. It is important that the spread of antibiotic-resistant bacteria is halted, before even the drugs reserved for resistant infections become ineffective.

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