



Pittsburgh Regional Healthcare Initiative

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MRSA: a short history of a monster microbe

Got an infection? Take an antibiotic. The process is so common that it's easy to forget about the days when people lived in mortal fear of bacterial infections. There was no cure. The only defense was prevention, through scrupulous hygiene in home and hospital.

During the early part of the 20th century, fewer than 45% of people lived to the age of 65. Until the mid- 20th century, infectious diseases were the leading cause of death. Despite Alexander Fleming's serendipitous discovery in 1928 of the first bactericidal antibiotic, it was not until the early 1940s that penicillin was actually produced and used to treat infectious diseases—including infections caused by *Staphylococcus aureus*.

The cycle: mutation, response

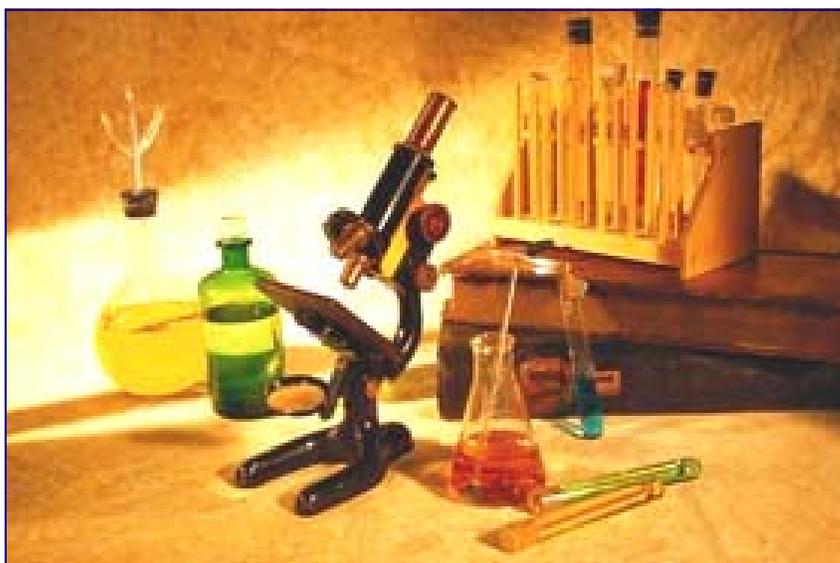
Just a decade later, a resistant strain of *Staph aureus* emerged. It was resistant not only to penicillin, but the new antibiotic arsenal as well: erythromycin, streptomycin, and tetracycline. Clinicians were learning an ominous lesson: *Staph aureus* mutated. It was 1955, and “modern medicine” was unable to effectively treat the new strain.

Faced with this challenge, scientists and health care professionals continued to work collaboratively to control the transmission of the resistant *Staph* strain and find a cure. By 1960, methicillin was the newest, most effective weapon against *Staph aureus*.

In the late 1970s, hospitals in eastern Australia saw the first outbreaks of methicillin-resistant *Staphylococcus aureus* (MRSA). By the 1980s, MRSA had emerged in various places throughout the world.

Once unleashed, spread begins

While initial antibiotic resistance emerged as a mutation around antibiotics in specific patients, today MRSA is passed through contact transmission—most frequently in hospitals by



healthcare workers. Moreover, even today, the primary transmission mechanism for MRSA is commonly not understood by doctors and other healthcare workers.

Reliance on new medical miracles, new antibiotics, seems to have overtaken the will of many in the healthcare professions to take MRSA transmission seriously. But today, only one proven antibiotic, vancomycin, remains to combat MRSA. Two cases of vancomycin-resistant *Staphylococcus aureus* have been reported in the U.S.—one of those in Pennsylvania.

Countries that have controlled it

Stark differences in healthcare practices have led to stark differences in MRSA rates. Other countries have stressed the importance of shutting down opportunities for transmission, and have not relied so heavily on aggressive antibiotics.

✧ In the Netherlands, Scandinavia and western

Australia, MRSA is uncommon, with sporadic outbreaks quickly contained. While over 50% of *Staph aureus* infections in the US are methicillin-resistant, in the Netherlands, that figure is less than 1%.

✧ In Belgium and France, countries that once had a high prevalence, MRSA has been stabilized and confined.

✧ In Paris hospitals, prevalence went from 55% in 1993 to 25% in 2002.

These communities worked together on the problem, strictly adhering to well known hygiene and surveillance guidelines, with the intent of stopping transmission.

Control in the U.S.

One hopeful example of community response occurred during a vancomycin-resistant *enterococci* (VRE) outbreak between 1997-1999 in the common border area of Iowa, Nebraska and South Dakota known as the Siouxland. This outbreak was fatal to four children. Shocked healthcare workers mobilized, sought help from the CDC and contained it. A lasting legacy of the VRE task force has been that the entire Siouxland community maintains a long-term commitment to the regular practice of infection control.

MRSA not confined to hospitals

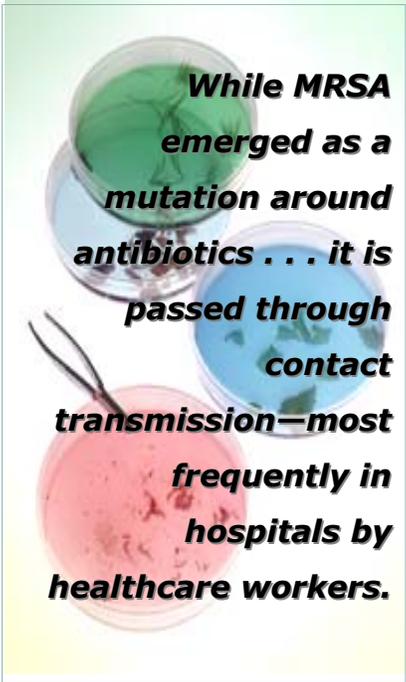
Is MRSA beginning to jump the hospital walls? In 2003, more than 900 prisoners in the Los Angeles County jail came down with boils and

rashes that resisted treatment with methicillin. A young athlete in Seattle died from a lesion. Smaller outbreaks have recently affected a Colorado fencing team, gay men in San Francisco, Texas school children, and several college football players in Pennsylvania.¹

Traced to their origins, the vectors for these infections are almost invariably the hands of healthcare workers. Halting the spread will require changes in attitudes as well as systems across an entire region.

Let's eradicate MRSA in Southwestern Pennsylvania

MRSA will prevail in our hospitals, ambulatory care facilities, and long term care facilities, as well as in our communities and homes, unless healthcare professionals across the entire community work together to eradicate it. The Pittsburgh Regional Healthcare Initiative aims to involve every healthcare professional in making Southwestern Pennsylvania a MRSA-free zone. ☞



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PRHI's Infection Control Advisory Committee comprises infectious disease physicians, infection control practitioners and others from institutions across the region who are interested in eradicating hospital-acquired infections. Partners include the Centers for Disease Control and Prevention (CDC), developers of the National Nosocomial Infection Surveillance (NNIS) System. ICAC will host focus groups aimed at eradicating MRSA from Southwestern Pennsylvania.

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