

## UNMASKING A NEW STAPHYLOCOCCUS

A new and especially resilient strain of bacteria has ballooned from a footnote on disease charts to an alarmingly widespread phenomenon often misdiagnosed because of its novelty. It has been linked to severe bloodstream infections leading to cases of multiorgan failure, pneumonia and even necrotizing fasciitis. Every area of the US has been affected, and researchers are scrambling to gather data and develop effective therapies to combat the new face of an old contagion.

The bacterium *Staphylococcus* was officially identified in the late 19<sup>th</sup> century and successfully controlled only by the debut of antibiotics. By the 1950s, however, it was already resistant to penicillin. There has been an ongoing battle to keep ahead of the common microbe which researchers estimate is carried in 25-30 percent of the population.

As original antibiotics failed, synthetic varieties like methicillin were introduced and able to treat the infections. In 1961, a strain of this nosocomial pathogen was discovered to be resistant again, and in recent years the prevalence rates of methicillin-resistant *Staphylococcus aureus* (MRSA) in US hospitals has grown to near 50 percent. Still, prior to the 1990s, the resistant strains surfaced almost exclusively in patients who had risk factors such as recent hospitalization or surgery, residency in a long-term care facility, dialysis or an invasive medical device.

In 1999, *Morbidity and Mortality Weekly Report* documented the deaths of four children in unrelated cases of infection with virulent MRSA in Minnesota and North Dakota. These children had no known risk factors for MRSA infection, bringing to light a new community-associated strain (CA-MRSA). More alarming yet is the fact that these

community-onset cases are on the rise throughout the country in otherwise healthy individuals.

## **IDENTIFICATION**

Most of these cases present as skin and soft tissue infections (SSTIs) and are often misdiagnosed as spider bites, even in areas where venomous spiders are not endemic. “Brown recluse spiders get a very bad rap,” says Amy Beth Kressel, MD, associate professor of clinical medicine. “There have been cases where a house was infested with hundreds and not a single person was bitten. And there have been cases of MRSA outbreaks in prisons where they were convinced it was spiders and brought in exterminators, but to no avail.”

Often CA-MRSA mimics the reaction caused by a venomous spider bite in that there’s a spontaneous appearance of a raised red lesion and a subsequent tendency for the lesion to develop necrotic areas. Manifestations of MRSA-related SSTIs range from mild superficial furuncles and carbuncles to deeper soft-tissue abscesses which require in-patient surgical incision and drainage along with intravenous antibiotics.

There is uncertainty as to the epidemiology of CA-MRSA. It differs from the healthcare-associated strain in that: 1) it carries a novel type of staphylococcal cassette chromosome *mec* (SCC*mec*); 2) it occurs in 5 to 15 percent of patients who lack the typical risk factors; 3) it is susceptible to more antibiotics although resistance to other classes such as fluoroquinolones and tetracyclines is increasing. This strain is also more likely to encode a putative virulence factor, Panton-Valentine leucocidin (PLV).

The tendency toward increased virulence in the community-onset strain (not previously connected with MRSA) can sometimes result in severe and invasive staphylococcal infections, such as necrotizing pneumonia and empyema, pyomyositis, osteomyelitis, necrotizing fasciitis and purpura fulminans, which resembles meningococcal sepsis.

Dr. Kressel stresses these virulence and resistance factors make CA-MRSA a different infection. “This is not the same staphylococci we were dealing with in the past,” she says. “And with its growing prevalence there’s no point in using Keflex or Augmentin as empiric therapy for a pimple or boil that appears to be a spider bite – the assumption should be that it’s not.”

## **TREATMENT**

Antibiotics aren’t necessarily the first line of therapy. Dr. Kressel suggests if a patient has a skin abscess with no surrounding cellulites, then supportive therapy with warm compresses to open it, or even lancing and draining the infection may be an adequate treatment. “Here we have organisms in that area already resistant to antibiotics,” she says. “We certainly don’t want to exacerbate the resistance problem.”

The key in these cases is follow-up – preferably within 48 hours. If a high fever or surrounding cellulitis develops, antibiotics are appropriate. They may also be appropriate therapy when SSTIs keep recurring and/or there is evidence that others in the household have similar symptoms.

When antibiotics are used, Dr. Kressel urges using older ones first, as they are often effective against this strain, and allow vancomycin or linezolid to be reserved for patients

with more severe complications such as osteomyelitis. “Call the labs,” she says. “Perhaps Bactrim or clindamycin or doxycycline will effectively eradicate it; these are reasonable choices. But because there may be variations of what works in some parts in the country, it’s critical to know what resistance patterns your local labs are seeing.”

## **RESEARCH IN PROGRESS**

Without much data yet collected, it’s important for physicians to collect specimens for culture when they test patients with abscesses or purulent skin lesions, in particular those with severe local infections, systemic signs of infection or a history of cluster or outbreak of infections among household members. When group outbreaks are evident, there is a tentative recommendation for decolonization by showering with chlorhexidine, laundering clothes, towels and bedding with hot water and use of a topical antibiotic like nasal mupirocin

Incidence of CA-MRSA varies geographically in the US, although there is a higher reported number of infections among children and young adults, individuals in low socioeconomic groups, inmates in correctional facilities, team sports participants, military recruits, day care attendees, men who have sex with men and Native Americans.

According to the Center for Disease Control (CDC), the common factors which appear to facilitate spreading the infection include frequent skin-to-skin contact, participation in activities that result in compromised skin surfaces, sharing personal items that may be contaminated with wound drainage and lack of personal hygiene.

Dr. Kressel sees frequent cases (at least one per week) and admits it’s a research work in progress. “I had a case recently where a patient had cellulitis in his femur, septic arthritis

in his hip and extensive MRSA in his blood. He had been a healthy guy who had no contact with the health care system, and the only history we could trace it to was an outbreak of boils under his arms,” she says. “We never saw things like that 10 years ago.”

## **PREVENTION**

Because so much is still unknown about the communicability of CA-MRSA, discernment of preventative measures is still underway. Unilaterally recommended, however are standard infection control precautions such as hand hygiene, wearing gowns, gloves and eye protection, and adequate spatial separation.

With this organism’s leap into the general community and its growing prevalence, patient education is more critical than ever. In addressing the known factors for spread of the potentially serious infection, physicians must stress the importance of the following practices:

Keep draining wounds covered with clean, dry bandages.

Clean hands regularly.

Maintain good general hygiene.

Do not share towels, clothing, bedding, bar soap, razors, etc.

Launder clothing that has come in contact with wound drainage and dry thoroughly.

Avoid having skin-to-skin contact with open wounds.

Clean equipment and other surfaces where multiple individuals have had bare skin contact. Be sure to use a disinfectant that specifies *Staphylococcus aureus* on the product label.

Although much remains unknown, it's important to remember CA-MRSA is still treatable. "I encourage physicians to check out the CDC web site," says Dr. Kressel. "There's a lot of good material to use for patient education – posters for the office as well as general information."