

# Community Associated Methicillin-Resistant Staphylococcus Aureus: an Emerging Infectious Disease in Los Angeles County

Methicillin-resistant Staphylococcus aureus (MRSA) is a well-known nosocomial pathogen but there have been increasing reports in the U.S., and on almost every continent, of MRSA skin infections in individuals with no known healthcare association.<sup>1</sup> In a recent study on the East Coast, the annual incidence of community associated MRSA (CAMRSA) was 18-25.7/100,000 people; 23% were hospitalized.<sup>2</sup> There have been reports of CAMRSA in multiple groups in Los Angeles County, including at the county Jail.<sup>3</sup> The prevalence of CAMRSA in the county is growing. In one local Emergency Room, 64% of skin and soft-tissue infections were caused by MRSA in 2003-2004 versus 29% in 2001-2002.<sup>4</sup> Since CAMRSA is resistant to the usual first line antibiotics for skin infections (penicillins,  $\beta$ -lactams) it is important for clinicians to be able to recognize CAMRSA infections and treat appropriately.

## Clinical and Epidemiological Hallmarks

CAMRSA is distinct clinically from healthcare associated MRSA (HAMRSA). HAMRSA is associated with invasive disease (pneumonia, bloodstream infections, surgical site infections) in older persons who have significant exposure to healthcare (hospitalized patients or in those on dialysis or who have indwelling catheters). However, in a recent population review of CAMRSA, 77% of the cases were skin and soft tissue infections (often misdiagnosed as "spider bites"), 10% were traumatic wound infections, and only 6% were invasive including bacteremia, meningitis, and osteomyelitis (an additional 2% were pneumonia).<sup>2</sup> While the majority of CAMRSA infections are skin infections, severe consequences of CAMRSA have been reported including necrotizing fasciitis, necrotizing pneumonia, and death.<sup>1</sup> Fortunately, these outcomes are rare.

Risk factors for CAMRSA include compromised skin integrity, close crowded living conditions, sub-optimal cleanliness, frequent skin to skin contact, contaminated surfaces and shared items.<sup>5</sup> Outbreaks have been reported in athletes (especially football players), the military, correctional facilities, schools, and men who have sex with men (MSM). Risk factors in outbreaks have been primarily sharing personal items (towels, razors, soap) and equipment.<sup>6, 7</sup> In a study based on Los Angeles County, risk factors among HIV+ MSM included drug use and recent sexually transmitted infections.<sup>8</sup> Drug users and the homeless have also been found to have a relatively high level of CAMRSA in San Francisco and these populations overlap with those in correctional facilities.<sup>9</sup> However, CAMRSA has been reported in people with no known risk factors. Children appear to be at higher risk for CAMRSA.<sup>2</sup> Having a close contact with a skin infection is a risk factor for CAMRSA. It is not clear if immunosuppression is a risk factor for CAMRSA.

## Laboratory Hallmarks

HAMRSA and CAMRSA can be differentiated with several laboratory tests. CAMRSA tends to be more sensitive than

HAMRSA to oral antibiotics including clindamycin, tetracycline, and trimethoprim-sulfamethoxazole (TMP-SMX) with variable sensitivity to the fluoroquinolones or erythromycin. In strains with erythromycin resistance, the D-test is used to determine the presence of inducible clindamycin resistance.

CAMRSA is further distinguished from HAMRSA by the presence of genes for Panton-Valentine leukocidin (PVL), a potent toxin that causes tissue necrosis, and the type IV staphylococcal cassette chromosome (SCC)mec.<sup>1</sup> Furthermore, CAMRSA and HAMRSA have distinctly different pulsed-field gel electrophoresis (PFGE) patterns, indicating that they derived from different strains of Staphylococcus aureus.<sup>10</sup> In Los Angeles County, the prevalent CAMRSA PFGE pattern is USA 300.

Characteristic	HAMRSA	CAMRSA
Clinical	Surgical site infections, invasive	Skin infections, "bug bites", rarely invasive, multiple, recurrent
Epidemiology	Old, healthcare	Young, athletes, drug users, correctional facilities and military
Antibiotic Resistance	Multi-drug resistant	$\beta$ -lactam resistant
Molecular Markers	PVL- SCCmec I-III	PVL+ SCCmec IV

## Summary Chart:

## Healthcare acquired CAMRSA

There have been several reports of patients acquiring strains of CAMRSA while in hospitals. These outbreaks have occurred in healthy newborn nurseries, a post-partum ward, and in a burn unit.<sup>11-13</sup> Poor infection control probably contributed to the spread of CAMRSA in the hospitals.

## Treatment

### For Wounds

Given the increasing prevalence of CAMRSA skin infections, the era of empiric treatment of skin infections with  $\beta$ -lactam antibiotics may soon be over, especially for invasive infections. There are no specific clinical findings associated with CAMRSA (other than the common misdiagnosis of "spider bite.") Physicians are encouraged to perform incision and drainage (I&D) on all appropriate lesions and send the product for culture.<sup>5</sup> Cultures should be sent, even if antibiotics are not being considered for treatment as the antibiogram can guide subsequent antibiotic treatment should the patient not improve with wound care. Warm compresses and/or I&D might adequately treat many CAMRSA skin infections without the use of antibiotics. Several studies have shown that selected patients do just as well with wound care with or without  $\beta$ -lactam antibiotics, as they do with appropriate antibiotics.<sup>2,14</sup>

Continued on page 5

## Community Associated Methicillin Resistant Staphylococcus Aureus: an Emerging Infectious Disease in Los Angeles County...from page 4

For those infections that require antibiotics, physicians should carefully monitor trends in organisms and antibiotic susceptibilities in skin infections in their practices. Physicians should ask patients about risk factors for CAMRSA or if they have a close contact with a skin infection. With an increasing prevalence of CAMRSA, physicians should consider empiric treatment of skin infections with antibiotics that have activity against CAMRSA such as TMP-SMX, clindamycin, or tetracyclines. If a physician considers group A streptococcus as a cause of the skin infection, then clindamycin would be a better choice. Guidelines by the Infectious Diseases Society of Washington provide a good overview of empiric treatment for skin infections in the era of CAMRSA and may be found at the website <http://www.metrokc.gov/health/providers/epidemiology/MRSA-guidelines.pdf>.

### Decolonization

At this time, LACDHS does not recommend attempting to decolonize patients upon first presentation with CAMRSA. Decolonization should be reserved for recurrent infections in a person who is not otherwise being repeatedly re-exposed to the organism. Decolonization may include topical mupirocin to the nares and showers with specific antimicrobial soap (chlorhexidine) for five days. Before undertaking a decolonization routine, physicians should question patients about ongoing exposure to CAMRSA including household and sexual partners with skin lesions and other activities. In some circumstances, it may be prudent to recommend simultaneous decolonization of an entire household or of sexual partners.

### Education

Since MRSA can colonize the nares, groin, rectum, axilla, and umbilicus it is important to educate the patient about good hygiene including washing hands, taking showers, using soap, using proper laundry procedures, and ensuring a clean home environment. Bandages should be disposed so that other household members are not exposed to them. Guidelines for patients can be found at <http://lapublichealth.org/acd/MRSA.htm>.

### Infection Control

To protect patients against CAMRSA in healthcare settings, physicians need to practice exemplary infection control including washing hands between patients and using contact precautions for all patients with draining wounds. These measures will protect healthcare workers and their patients.

### Public Health Notification

At this time, MRSA is not a reportable disease in Los Angeles County, though some jurisdictions might have special surveillance projects. However, it is the duty of every healthcare practitioner to notify the local health department of an outbreak of any disease (Title 17, California Code of Regulations, § 2500). If a physician identifies an outbreak of CAMRSA in an athletic team, a group home, or in a group of people with clear epidemiologic links, the

physician should call the Acute Communicable Disease Control Program at 213-240-7941. We can assist with control measures.

### Further Information

The county health department has developed a website with clinical guidelines on CAMRSA (including pictures of typical lesions) and patient education. We have also developed and posted a comprehensive guideline to the prevention of the transmission of Staph in non-healthcare settings which can be used for public settings and can be adapted for household use. This information can be found on the website: <http://lapublichealth.org/acd/MRSA.htm>.

### Reference List

- (1) Eady EA, Cove JH. Staphylococcal resistance revisited: community-acquired methicillin resistant Staphylococcus aureus--an emerging problem for the management of skin and soft tissue infections. *Curr Opin Infect Dis* 2003;16(2):103-24.
- (2) Fridkin S, Hageman JC, Morrison M et al. Methicillin-Resistant Staphylococcus aureus Disease in Three Communities. *N Engl J Med* 2005;352(14):1436-44.
- (3) CDC. Outbreaks of community-associated methicillin-resistant Staphylococcus aureus skin infections--Los Angeles County, California, 2002-2003. *MMWR* 2003;52(5):88.
- (4) Moran GJ, Amii RN, Abrahamian FM, Talan DA. Methicillin-resistant Staphylococcus aureus in Community-acquired Skin Infections. *Emerg Infect Dis* 2005;11(6):Available from <http://www.cdc.gov/ncidod/EID/vol11no06-04-0641.htm>.
- (5) CDC. Centers for Disease Control and Prevention. Community-Associated MRSA: Frequently Asked Questions. [http://www.cdc.gov/ncidod/hip/Aresist/ca\\_mrsa.htm](http://www.cdc.gov/ncidod/hip/Aresist/ca_mrsa.htm). Accessed April 25, 2005. 2005.  
Ref Type: Pamphlet
- (6) Nguyen DM, Mascola L, Bancroft E. Recurring Methicillin Resistant Staphylococcus aureus Infections in a Football Team. *Emerg Infect Dis* 2005;11(4):528-32.
- (7) CDC. Methicillin-Resistant Staphylococcus aureus Skin or Soft Tissue Infections in a State Prison - Mississippi, 2000. *MMWR* 2001;50(42)(October 26, 2001):919-22.
- (8) Lee NE, Taylor MM, Bancroft E et al. Risk Factors for Community-Associated Methicillin-Resistant Staphylococcus aureus Skin Infections among HIV-Positive Men Who Have Sex with Men. *Clinical Infectious Diseases* 2005;40:1529-34.
- (9) Young DM, Harris HW, Charlebois ED et al. An epidemic of methicillin-resistant Staphylococcus aureus soft tissue infections among medically underserved patients. *Arch Surg* 2004;139(9):947-51.
- (10) McDougal LK, Steward CD, Killgore GE, Chaitram JM, McAllister SK, Tenover FC. Pulsed-field gel electrophoresis typing of oxacillin-resistant Staphylococcus aureus isolates from the United States: establishing a national database. *J Clin Microbiol* 2003;41(11):5113-20.
- (11) Bancroft E, Kilgore G, Jones A et al. Four Outbreaks of Community-Associated Methicillin-Resistant Staphylococcus aureus in Los Angeles County. Abstract. 41st Annual Meeting of the Infectious Disease Society of America. October 2003. San Diego, CA.
- (12) Saiman L, O'Keefe M, Graham P et al. Hospital transmission of community-acquired methicillin-resistant Staphylococcus aureus among postpartum women. *Clinical Infectious Diseases* 2003;37(10):1313-9.
- (13) Simpson ML, Steinman K, Bennett ME, Phillips I. Nosocomial Outbreak of Methicillin Resistant Staphylococcus aureus- USA 300 (MRSA-USA 300) in a Burn Unit. Abstract. Presented at the 15th Annual Meeting of the Society for Healthcare Epidemiology of America. Los Angeles, CA 2005.
- (14) Lee M, Rios A, Aten M et al. Management and outcome of children with skin and soft tissue abscesses caused by community-acquired methicillin-resistant Staphylococcus aureus. *Pediatr Infect Dis J* 2004;23(2):123-7.