Clark County Health District · Office of Epidemiology

Epidemiology Newsletter

CLARK COUNTY HEALTH DISTRICT

Community Acquired Methicillin-Resistant Staphylococcus Aureus

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In the past, methicillin-resistant *Staphylococcus aureus* (MRSA) infections have been acquired almost exclusively in hospitals, long-term care facilities, or similar institutional settings (1). Risk factors for healthcare facility-associated MRSA colonization or infection include prior antibiotic exposure, admission to an intensive care unit, surgery, or exposure to an MRSA-colonized or infected patient (1,2). However, recent disease surveillance activities in Clark County for MRSA have revealed that strains of community-acquired methicillin *Staphylococcus aureus* (CA-MRSA) are emerging. Experiences with MRSA in cities across the nation are strikingly similar.

Acute infections caused by CA-MRSA may present as typical wound infection, cellulitis, or may be misdiagnosed as a "spider bite" (with or without cellulitis). During surveillance activities conducted in 2003 in Los Angeles (LA) county, of 62 reported cases of pediatric CA-MRSA, the most common diagnosis was cellulitis, which accounted for more than half of the reported illnesses. Also of note, was that 25% of the interviewed guardians of these patients had thought that their child's infection was due to a "spider or bug bite". Twenty-four percent of the guardians stated that the affected child was exposed to another individual with similar lesions in the month preceding onset of symptoms. It was discovered during post treatment follow up with the patients' families that 12% of contacts in the home also developed a skin lesion (3). This was strong evidence of transmission within the household.

Investigations of pediatric CA-MRSA cases here in Clark County and in communities across the nation have led to speculation that the epidemiology of *S. aureus* is changing (4-7). Epidemiologic features show a major departure from those previously thought to be associated with MRSA colonization or infection. Historically, investigations of CA-MRSA cases demonstrated risk factors (i.e., contact with healthcare facilities, previous antimicrobial therapy) that were similar to nosocomially-associated MRSA. More recent reports describe transmission in populations lacking these risk factors (8). A study from Chicago found a 25-fold increase in the number of children admitted to the hospital with an MRSA infection lacked an identifiable risk factor for prior colonization (4). Isolates for CA-MRSA are usually susceptible to multiple antibiotics, which is in contrast to the typical, multiple-drug-resistant hospital isolates. Like those in the Chicago study, four children from rural Minnesota and North Dakota who died in 1999 from infections caused by CA-MRSA, lacked risk factors for MRSA infection. The infections were caused by strains susceptible to several antibiotics, except beta-lactams. The PFGE patterns of these strains indicated that they were related to one another but differed from typical nosocomial isolates circulating in local hospitals. All of the isolates from LA county pediatric patients described above also showed resistance to beta-lactam antibiotics. Additionally, the results of sensitivity testing indicated that most were also resistant to ciprofloxacin and levofloxacin (3).

Recent Clark County data for pediatric *S. aureus* infections echoes the findings in these other communities. Data obtained from a local commercial laboratory for the first four months of 2004 shows that of all pediatric cultures positive for *Staphylococcus aureus*, 17% were MRSA. For the same 4-month period, of all cultures positive for MRSA, only 38% were sensitive to levofloxacin. Data on sensitivity for ciprofloxacin was not available.

Additional evidence for the changing epidemiology of *Staphylococcus aureus* has been found by Quest Diagnostics. In a

microbiology update distributed on June 2, 2004, they reported the development of a new "form of resistance" to clindamycin. They stated: "It has become clear that many strains resistant to erythromycin may also be resistant in vivo to clindamycin, even if standard susceptibility results indicate that they are *sensitive*. This type of resistance is called *inducible* resistance which the commonly used susceptibility test cannot detect." (9)

This year, the Clark County Health District began working with two local detention centers to conduct MRSA surveillance on inmates as they are admitted to the facilities. Inmates are screened for all skin and soft tissue lesions. Lesions with exudate are cultured. The standard treatment recommended for MRSA by the Bureau of Prisons is trimethoprim-sulfamethosazole (TMP-SMX), with or without rifampin. Thus far of 93 cultures that were positive for MRSA, 98% were sensitive to TMP-SMX. Patients with TMP-SMX-resistant infections were switched to an alternative antibiotic. The table below illustrates a progression to levoloxacin-resistance in the specimens obtained from detention center inmates:

Table 1. MRSA Resistance Patterns from Detention Center Inmates (Clark County 2004)

Pattern #	Oxacillin	Levofloxacin	% of Cultures
1	R	S	58%
3	R	I	31%
2	R	R	11%

R = Resistant I = Intermediate S = Sensitive

There is insufficient Clark County data at this time to estimate the true prevalence of CA-MRSA. However, through recently initiated surveillance of *S. aureus*, there is evidence that the emergence of MRSA within the community may become a major threat with several important clinical implications, including treatment failure with accompanying complications and increases in medical costs and morbidity. Currently most strains of CA-MRSA are susceptible to a large number of available antibiotics. However, there appears to be a disturbing trend towards multi-drug resistance. Already we are seeing decreasing sensitivity to levofloxacin, and there is additional evidence of erythromycin and clindamycin resistance. Inappropriate or incomplete antibiotic treatment may further exacerbate the problem of antimicrobial resistance. It seems inevitable that the prevalence of resistant strains will increase over time unless efforts are made to minimize the antibiotic pressure favoring selection of resistant strains (7).

The Clark County Health District, Office of Epidemiology will be expanding surveillance activities for CA-MRSA. We hope in the near future to acquire data from all local hospitals and detention centers. Although CA-MRSA is not currently on the Nevada list of reportable diseases, we encourage all healthcare providers to report culture-confirmed cases to the Office of Epidemiology at 759-1300. It is only through routine culturing of suspect lesions that we will be able to obtain sufficient data to monitor the resistance patterns and prevalence of resistant strains of *Staphylococcus aureus*.

[1]Thompson RL, Cabezudo I, Wenzel RP. *Epidemiology of nosocomial infections caused by methicillin-resistant Staphylococcus aureus*. Ann Intern Med 1982 ;97 :309-17.

[2]Boyce JM. *Methicillin-resistant Staphylococcus aureus: detection, epidemiology, and control measures*. Infect Dis Clin North Am 1989 ;3 :901-13.

[3]County of Los Angeles, Department of Health Services, *The Public's Health*, September 2003.

[4]Herold BC, Immergluck LC, Maranan MC, Lauderdale DS, Gaskin RE, Boyle-Vavra S, et al. *Community-acquired methicillin-resistant Staphylococcus aureus in children with no identified predisposing risk*. JAMA 1998 ;279 :593-8.

[5]CDC. Four pediatric deaths from community-acquired methicillin resistant *Staphylococcus aureus*—Minnesota and North Dakota, 1997-1999. MMWR Morb Mortal Wkly Rep 1999 ;48 :707-10.

[6]Boyce JM. *Are the epidemiology and microbiology of methicillin-resistant Staphylococcus aureus changing?* JAMA 1998 ;279 :623-.

[7]Chambers, Henry F. *The Changing Epidemiology of Staphylococcus aureus ?* Emerging Infectious Diseases, Vol. 7, No. 2. Mar-Apr 2001.

[8]Adcock PM, Pastor P, Medley F, Patterson JE, Murphy TV. *Methicillin-resistant Staphylococcus aureus in two child care centers*. J Infect Dis 1998 ; 178 :577-80.

[9]Quest Diagnostics, *Microbiology Update*, June 2, 2004.