

# CONTAGIOUS COMMENTS

## Department of Epidemiology

### Community-associated MRSA in Children

Sean O’Leary, MD; Elaine Dowell, MT, SM(ASCP); James Todd, MD

**Who has MRSA?** Methicillin-resistant *Staphylococcus aureus* (MRSA) is an established community pathogen. As rates increase locally, nationally, and internationally, we have seen a dramatic increase in press coverage of MRSA as well, making it a frequent topic of discussion among people seeking health care, even among those not affected by it. Humans are a natural reservoir for *S. aureus*, and the anterior nares, axillae, and groin are the usual sites of colonization. In patients with chronic disease and with skin conditions such as eczema, the entire surface of the skin is often a site of colonization. The latest nationwide data shows that 28.6% of Americans are colonized with *S. aureus*, with 1.5% of us colonized with MRSA. However, colonization with MRSA is much higher in certain communities: 9% of children at well child checks in Nashville were colonized with MRSA, and in Corpus Christi, Texas, 22% of children admitted to a children’s hospital were colonized! The percentage of children in Colorado that are colonized is unknown, but we suspect somewhere between 1 and 5%.

**What diseases are caused by MRSA?** In 1997, the issue of community-acquired MRSA became much more visible and disturbing when 4 children in Minnesota and North Dakota died of infections caused by this organism. Infections with CA-MRSA are now widespread with reports of outbreaks in correctional facilities, participants in contact sports such as wrestling and football, and in military personnel. Recurrent skin infections are common (even more frequent in children with eczema). Infection in more than one family member is common. Clinical presentations of wounds that look like an “insect bite” or “spider bite,” folliculitis, pustular lesions, boils and abscesses may be MRSA. Although most of these cases involve skin and soft tissue infections, approximately 5% are associated with invasive diseases including bacteremia/sepsis, necrotizing pneumonia, septic arthritis, osteomyelitis, and bursitis. This requires that laboratories rapidly identify MRSA. TCH uses the PBP2a agglutination test to detect the protein product of the *mecA* gene. This saves a time in getting an initial result but it takes another day to determine susceptibility to other antibiotics.

**What’s the difference between hospital-associated MRSA and community-associated MRSA?** Throughout the medical and lay literature, MRSA is traditionally subdivided into CA-MRSA (community

acquired/associated) and HA-MRSA (hospital acquired or health care associated) – see Table 1. Recently, however, these lines have become blurred, as there are reports from hospitals across the country of strains considered CA-MRSA by molecular analysis causing health care associated infections. That said, there is some utility in making the distinction, as most of the strains circulating in the community are still CA-MRSA (particularly the ones causing recurrent boils). The traditional distinguishing features are outlined in the table below:

Table 1: Traditional differences between community- and hospital-associated MRSA strains

HA-MRSA	CA-MRSA
Similar strains	Large genetic difference in strains
More likely multi-drug resistant	Usually resistant only to beta-lactams
<i>mecA</i> gene similar among strains	A variety of <i>mecA</i> genes
More likely in at-risk patients	Healthy patients
Rarely possess PVL*	98% PVL positive
Toxin production unusual	Toxin production common

\*PVL is Panton Valentine Leukocidin, a pore forming toxin highly associated with strains of MRSA causing skin and soft tissue infections and severe invasive disease.

**What antibiotics should I use?** As in the table above, CA-MRSA strains are more likely than health care associated MRSA isolates to be susceptible to TMP/SMX, tetracyclines, and clindamycin although special laboratory methods must be used to assure clindamycin susceptibility (the D test). Table 2 shows the 2007 antibiogram for overall *S. aureus* isolates from the TCH Microbiology Laboratory. Note that the TCH antibiogram reflects both isolates obtained in the hospital and those obtained in outpatient settings, so our true rate of clindamycin susceptibility for community associated strains is actually much higher (>90%).

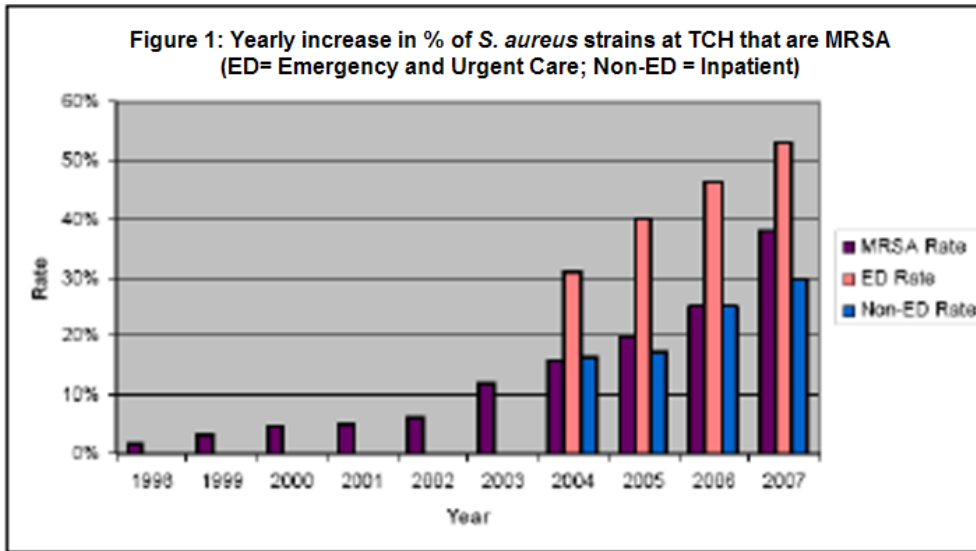
Table 2: Antimicrobial Susceptibilities at The Children’s Hospital – 2007 <i>Staphylococcus</i> (% susceptible)								
ORGANISMS	NUMBER OF ISOLATES TESTED	ANTIMICROBIALS						
		Penicillin (IV/PO)	Oxa-/Naf-/Dicloxacillin (IV/PO)	Cefazolin Cephalixin (IV/PO)	Trimethoprim / Sulfis (IV/PO)	Erythromycin (IV/PO)	Clindamycin (IV/PO)	Vancomycin (IV)
<b>Staph aureus</b>								
• <i>Staph aureus</i> (MSSA)	299		100	100	99	84	86	100
• <i>Staph aureus</i> (MRSA)	291	0	0	0	97	10	70	100
<i>Staph epidermidis</i>	133	5	17	17	63	26		100

Testing by Microscan panels – Confirmation of MRSA by PBP2’ testing and Chromagar

Figure 1 is an illustration of our percentage of *S. aureus* isolates that are MRSA going back to 1998. Of particular note is that the percentage of MRSA in the ED (and other outpatient settings such as Broomfield, Parker, and the Child Health Clinic) is much higher than the inpatient setting, reflecting the high prevalence of MRSA that we are currently seeing in our community. 2007 was the first year where we see greater than 50% of the isolates resistant to methicillin, illustrating the importance of covering for MRSA when empirically treating serious skin or soft tissue infections.

empiric therapy for Group A Strep infections. Clindamycin is a good empiric choice from a microbiologic perspective, but palatability in younger patients is often problematic (one may use capsules opened into chocolate syrup as an alternative to the wretched taste of the liquid formulation).

For hospitalized patients with severe invasive infections, vancomycin remains the empiric drug of choice, although there are now several alternatives available as well. We usually add clindamycin if toxin-mediated disease (such as Toxic Shock Syndrome) is suspected.



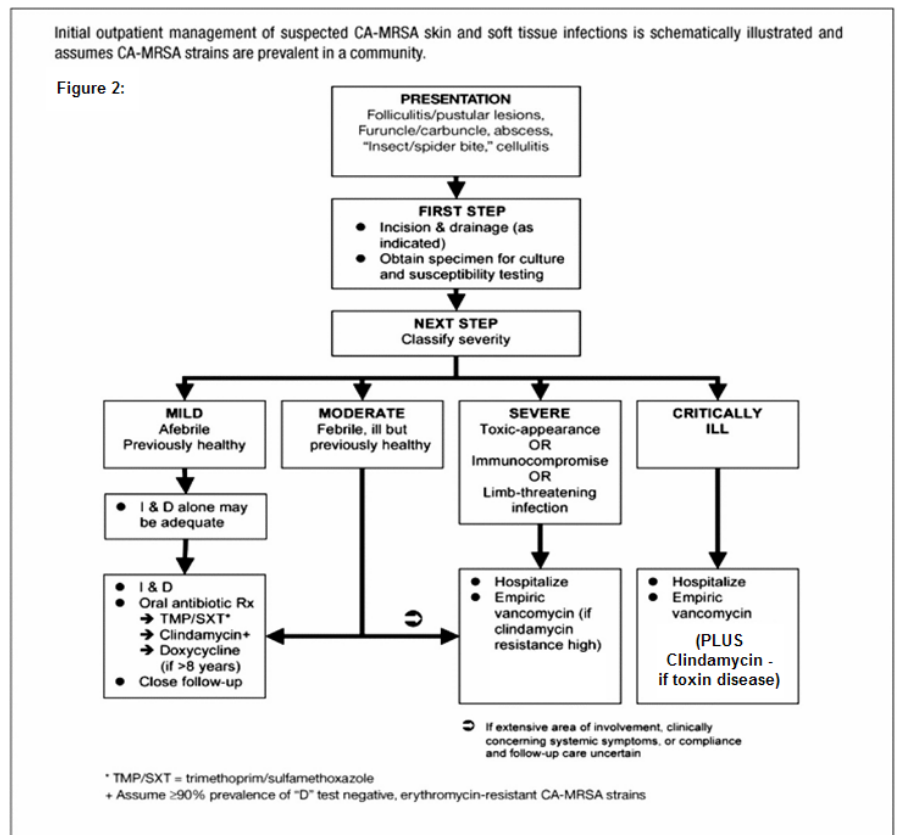
### How can transmission be prevented?

In health care facilities, inanimate surfaces are occasional sources of nosocomial spread, although the contaminated hands or gloves of health care workers usually serve as intermediate transmission vectors. Thus, strict infection control policies such as we have at TCH that include isolation and barrier precautions are critical components of prevention. Hand hygiene and wound coverage also are important to prevent transmission. Community physicians should focus on good handwashing between patients and proper cleaning and disinfection of the examination rooms. There are currently no restrictions in the community (i.e.,

daycare, school) for patients with MRSA. In 2003, the Colorado Department of Public Health and Environment

Treatment of possible CA-MRSA is dependent on several factors, including degree of illness, local susceptibility patterns, age of the patient, history of prior infections (if available the susceptibilities of prior isolates), and the type of infection. Figure 2 illustrates a reasonable treatment algorithm. Note that for smaller abscesses (<5 cm), incision and drainage alone is often adequate *without* the use of antimicrobials. Also crucial is obtaining a specimen for culture. This is straightforward for abscesses or draining wounds: aspirate and then send the specimen in a capped syringe (without the needle) or in a sterile container, such as a urine cup (preferably not a swab since fluid is always a better culture specimen than dried material on a swab). For cellulitis where there is no appreciable pus, a simple effective method is to aspirate under negative pressure with a large bore needle at the point of maximal inflammation. Even if no pus is observed, there is a core of tissue in the needle so inject it into a blood culture bottle and flush the hub of the needle out with the fluid in the blood culture bottle.

Regarding treatment of cellulitis, although ~99% of our MRSA isolates are susceptible to TMP/SMX, remember that this is not good



(CDPHE) convened an MRSA in School / Childcare Settings Working Group. The group developed recommendations that can be used to determine the appropriateness of children with MRSA attending these settings. Many factors are taken into consideration as each situation is often unique. These recommendations can be found on the CDPHE Web site: ([http://www.cdphe.state.co.us/dc/epidemiology/CO\\_MRSA\\_schools5\\_03.pdf](http://www.cdphe.state.co.us/dc/epidemiology/CO_MRSA_schools5_03.pdf))

CA-MRSA continues to be an ever increasing problem in the pediatric setting. Because MRSA can be a serious hospital pathogen, isolation precautions in the inpatient and TCH hospital associated (KidStreet, Medical Day Treatment) programs are very stringent and often disqualify known MRSA patients from participation in these programs. Community outpatient settings are different in that there is generally not as high a concentration of medically fragile patients as an inpatient setting. Excellent hand hygiene by health care providers is the rule in outpatient settings.

#### **What can I do about recurrent MRSA in my patients?**

Many families suffer from recurrent MRSA infections, and there are often questions about how best to keep them from recurring. First, it is important to recognize that most people that have skin and soft tissue infections do not go on to develop invasive disease. However, many families undergo significant distress from the frequent doctor visits, incision-and-drainage procedures, and multiple courses of antibiotics that go part and parcel with recurrent MRSA. Prevention is an area of intense research, and unfortunately, at this point in time, there is no regimen that guarantees success. There are several simple guidelines families can follow to help reduce the risk of future infections, outlined below (see also: <http://www.cdc.gov/mrsa/>):

1. Cover draining wounds with 2 layers..
2. Wash hands before and after touching wounds.
3. Change clothes daily (especially underwear!).
4. Frequent changes of sheets, towels etc. Recommendations from different experts vary from daily to twice a week.
5. Bathe regularly with use of soap. Regular soap is fine – there is no need for antibacterial soap.
6. Avoid sharing items that may carry bacteria (towels, bedding, clothes, razors, athletic equipment).
7. Clean athletic equipment with agents effective against MRSA (a solution of dilute bleach).
8. Reinforce good hygiene to prevent infection and spread within families.
9. Frequent hand washing (regular soap is fine) and keep fingernails short.
10. If a child suffers from eczema (or other skin conditions), get this under control as much as possible, as children with skin problems have a tendency to get more infections.
11. Review skin regularly, particularly under the armpits and the groin/buttocks area.

If all the above measures are being done, and a child continues to get MRSA infections, there are sometimes other things one

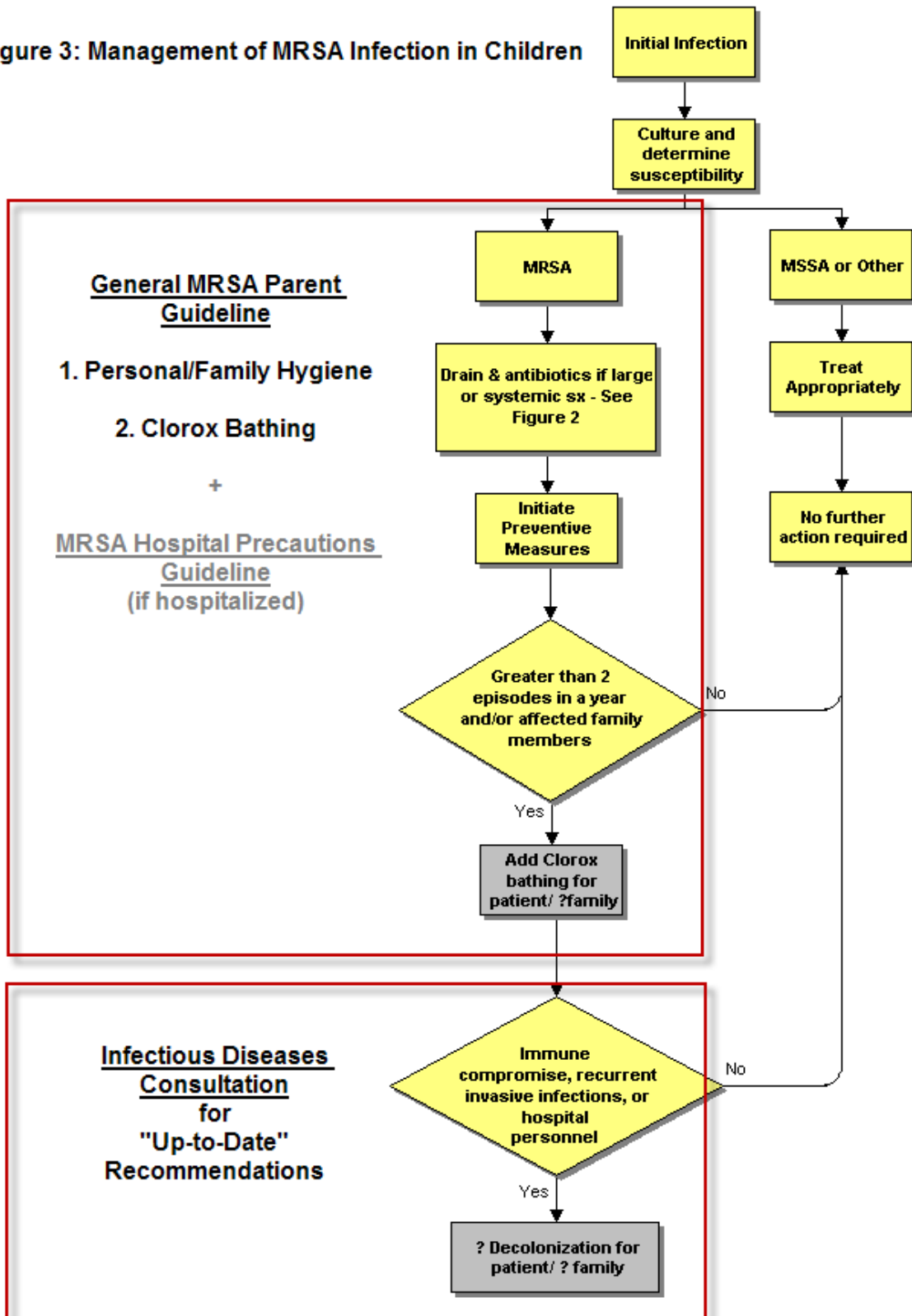
can try; these do not always work, and can be very labor intensive and expensive!

1. Clorox baths twice per week for 15 minutes for 3-6 months (1 tsp Clorox per gallon of water) for all affected family members. This is no stronger than a swimming pool, and may help get rid of MRSA on the skin.
2. In general, we do not recommend oral or topical antibiotics to try to stop recurrent MRSA, since recolonization often occurs with current regimens. Ongoing studies will help clarify this issue. For children with serious problems contact us for up-to-date recommendations (720 777-6981).

A small subset of patients may require referral to an Infectious Diseases Specialist. These would include immune compromised patients, patients with recurrent invasive infections, hospital personnel, or any patient in whom the above measures have been rigorously undertaken that is still getting recurrent MRSA infections.

Figure 3 (next page) summarizes our recommendations for managing children with MRSA infections. Copies of our MRSA Parent Guidelines are attached and/or available by calling the Pediatric Infectious Diseases office at 720/777-6981. Another good reference can be obtained at: <http://www.cdc.gov/mrsa/>.

Figure 3: Management of MRSA Infection in Children





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Department of Epidemiology

**EDITOR:**

Kelly DeStefano, Staff Assistant III  
 The Children's Hospital, Dept. of Epidemiology, B-276  
 13123 E. 16<sup>th</sup> Avenue, Aurora, CO 80045  
 Phone: 720-777-6072; FAX: 720-777-7293

Destefano.kelly@tchden.org  
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