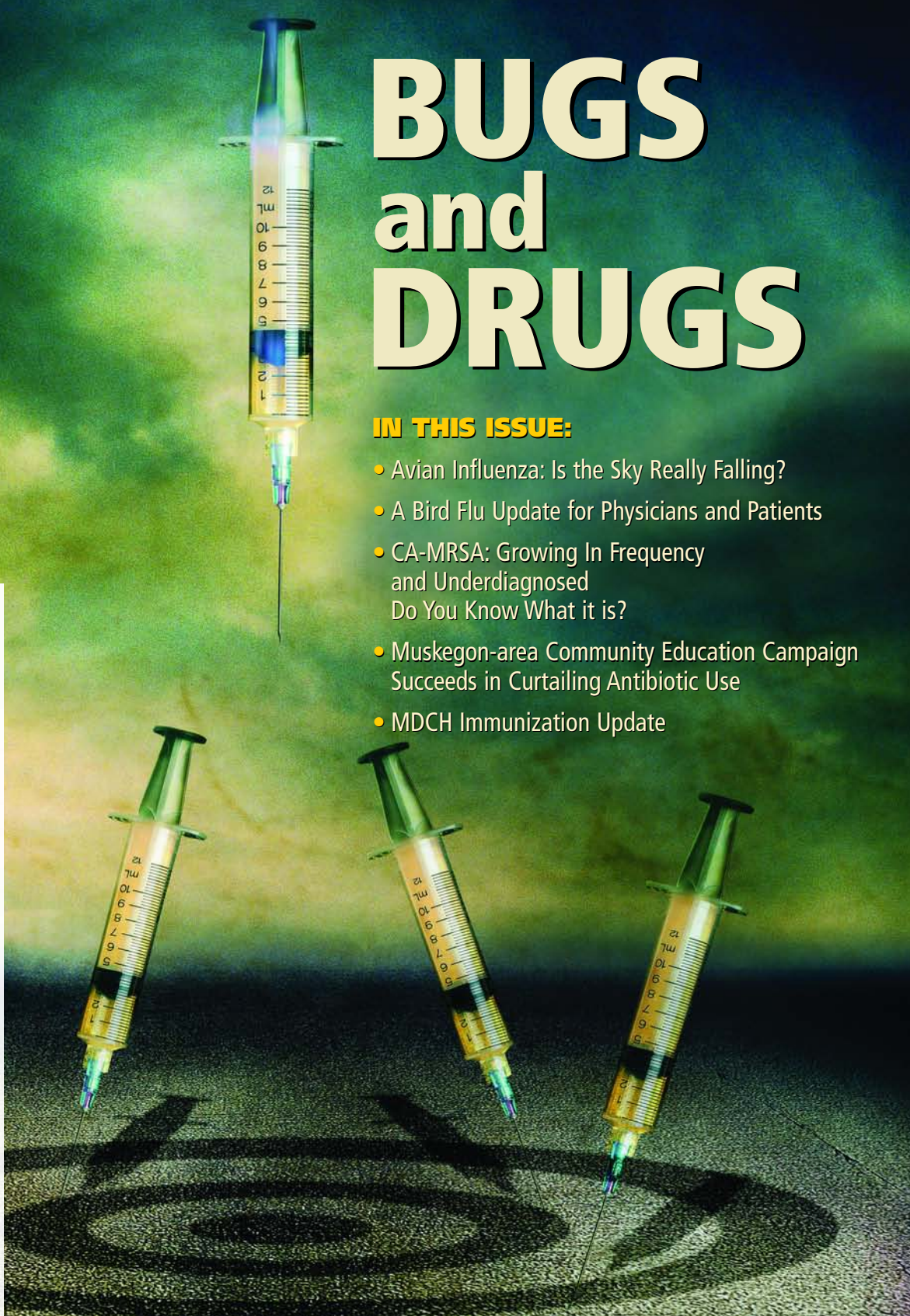


TRIAD

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BUGS and DRUGS

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**Community-Acquired
Methicillin Resistant
Staphylococcus Aureus:**

Attack of the Spiders?

by William Hitzelberger, D.O., senior medical resident, and Anthony Ognjan, D.O., FACP, Chief, Infectious Diseases, Mount Clemens General Hospital

We are certain that Michigan is not under attack by an epidemic of spiders, but here at Mount Clemens General Hospital (MCGH) in our infectious disease clinic, we sure are seeing a lot of skin infections ranging from minor irritations to more significant, large, necrotic and abscessed soft-tissue wounds, many self proclaimed by patients to be the result of a spider bite. Presenting in all seasons, all ages, both genders and with wounds most prevalent on the arms, legs, buttocks, thorax, head and neck, patients include army and navy personnel (and their spouses), semi-professional football players, high-school athletes, pediatric patients - many who are children from daycare settings (and their concerned parents), HIV patients and correctional facility inmates. What begins as a mild itch and erythema, rapidly deteriorates over a few days into painful, discolored and draining lesions with significant necrosis.

Patients suffering from these symptoms seem to have several things in common. All of them are otherwise healthy individuals with no recent medical problems or hospital confinements. Also, they present with a vague history of spider or unknown insect bite, having convinced their primary care provider that they actually have been bitten by some type of insect. These patients often return to their health care provider for "failing" antibiotic therapy, usually a first-generation cephalosporin or penicillin. We note that often the original wounds have not been cultured and ultimately the individuals are referred to our clinic or admitted to the hospital for a consultation for the treatment of a "spider bite"-failing therapy. The source of these infectious wounds is not a spider bite but a new variant of *Staphylococcus aureus* now designated as "Community-Acquired Methicillin Resistant Staphylococcus aureus (MRSA)." Community-acquired MRSA is increasing in frequency and practicing osteopathic physicians need to be aware of it.

Staphylococcus Aureus

Staphylococcus aureus is a gram positive bacterium (figure 1) commonly associated with colonization of the skin and mucous membranes of humans. At any give time, an estimated 20-30 percent of the population is asymptotically colonized by this organism. However, this bacterium is a *true* human pathogen and is responsible for countless community-acquired infections and hospital-acquired infections. The associated diseases or syndromes range from simple to complex skin infections such as furuncles, bullous impetigo, folliculitis, ecythema, and carbuncles (figures 2, 3, 4, 5, 6) to more invasive and systemic disease such as endocarditis, osteomyelitis and pneumonia (figures 7, 8, 9).

Before the advent of penicillin in the 1940's, *Staphylococcal* infections claimed many lives. Even with today's sophisticated medical science, *Staphylococcal* infections continue to be challenging, claiming 20-25 percent of the lives of individuals infected.³ Before the year 2000, almost all of the documented MRSA infections were hospital acquired. Since that time, however, 8-10 percent of community-associated *Staphylococcal aureus* infections nationally are documented as Methicillin resistant.

In northern Macomb County, hospital microbiology laboratory recovery rates of MRSA are alarming. In 1989, MRSA accounted for 5-10 percent of the *Staphylococcal* organisms recovered at Mount Clemens General Hospital. By 2006, the hospital's overall laboratory recovery rate of MRSA was consistently over 50 percent. This increasing MRSA rate is beginning to

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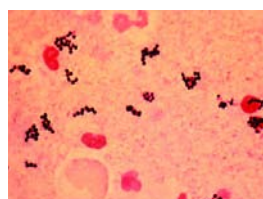


FIGURE 1



FIGURE 2



FIGURE 3

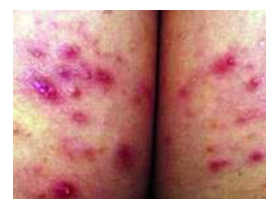


FIGURE 4

complicate antibiotic selection for not only our hospital-acquired *Staphylococcal aureus* infections but community-associated skin and soft-tissue infections as well. Often, initially misdiagnosed as an insect envenomation by a “spider” or other unknown insect, it is the failure to recognize and *culture* community-acquired MRSA infections that result in “wrong” empiric antibiotic selection and ultimate antibiotic failure.

Outbreaks of community-acquired MRSA have primarily been limited to select populations and lack the traditional risk factors associated with hospital-acquired MRSA, which include prolonged hospitalization, indwelling IV catheters, dialysis, and residence of a long-term care facility and a history of previous MRSA infections^{2,3,4} (Table A). While an outbreak of community-acquired MRSA in 1980-81 in the metropolitan Detroit area identified two thirds of the patients as intravenous drug abusers, more recent figures (since 2002), document cases of community-acquired MRSA among athletes participating in contact sports, military personnel, homosexuals, people who are incarcerated, Pacific islanders, Alaskan natives and native Americans.⁴

Factors associated with the spread of community-acquired MRSA soft tissue infections include poor hygiene, crowded living conditions, close skin-to-skin contact and open wounds.⁵ Often patients will state they have been bitten by a spider or insect, however, much of the time they don’t remember the actual event. In our experience at MCGH, community-acquired MRSA wounds often present, and curiously the average clinician does not recognize, in classic locations and resemblance of “furuncle,” “carbuncle,” soft-tissue abscess, impetigo or ecthyma.

The Centers for Disease Control

and Prevention, (CDC) have demonstrated that community-acquired MRSA isolates are not the typical nosocomial derived MRSA bacteria. These organisms are likely bacterial hybrids arising from the traditional hospital MRSA and community methicillin sensitive *Staphylococcal* organisms, and exhibit their own genotype. More severe and fatal infections, as well as those infections among the prison and native American population, have been associated with the USA 400 clone³, while athlete infections are most commonly associated with the USA 300 clone. Distinct from hospital-acquired MRSA, USA 300 and USA 400 have shown resistance to both the B-lactams and erythromycin, however, they are still susceptible to clindamycin, trimethoprim-sulfamethoxazole and fluoroquinolones.³

Diagnosis and Management

The diagnosis of community-acquired MRSA requires laboratory recovery of MRSA and assessment for any of the risk factors of hospital-acquired MRSA to exclude this diagnosis (Table B). It is essential to evaluate the skin and soft tissue structures for any possible abscess formation which would mandate incision and drainage. Cultures of any purulent drainage, either spontaneous or through surgical interventions, are absolutely essential for antibiotic direction.

Selection of antibiotics empirically should be guided by the *exclusion* of community-acquired MRSA and hospital-acquired MRSA in which traditional oral antibiotics for skin and soft tissue could be utilized. Agents such as ampicillin-sulbactam, dicloxacillin or a first generation

TABLE A – Community-Acquired MRSA

Individuals at Risk:

- Intravenous Drug abusers
- Athletes (especially contact sports or sharing of athletic equipment)
- Military Personnel (and spouses)
- Homosexual individuals
- Correctional facility inmates
- Pacific islanders
- Alaskan and Native Americans
- Pediatrics, Daycare center children

Contributing Factors:

- Poor hygiene
- MRSA nasal colonization, open lesions
- Crowded living conditions (correctional facilities, military barracks)
- Close skin-to-skin contact (intimacy, contact sports, sharing sports equipment)
- Contaminated inanimate objects: (toys, playground equipment, towels)

Exclusionary Factors (associated with institutional or hospital-acquired MRSA)

- History of prolonged hospitalization
- Indwelling IV catheters: (dialysis catheters)
- Resident in a long-term care facility (“specialty” hospitals, nursing homes)
- Previous institutional or hospital-acquired MRSA infections



FIGURE 5

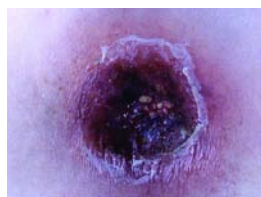


FIGURE 6



FIGURE 7



FIGURE 8



FIGURE 9

cephalosporin would be appropriate.

If community-acquired MRSA (or hospital-acquired MRSA) is suspected, then empiric oral antibiotics should consist of agents with known activity (Table C). It is important to evaluate throughout the course of treatment to ensure the infection is improving and all abscess “pockets” are adequately drained. Duration of antibiotics is directed by clinical response but usually spans 10-14 days. Deterioration or slow clinical responders suggests undrained abscess pockets, non-compliance with medical manage-

ment, progressive bacterial resistance or a secondary infection with a resistant organism.

For more severe skin and soft-tissue involvement, or any evidence of invasive disease, the patient should be admitted to the hospital for IV antibiotic and the possibility of more aggressive tissue debridments. For inpatient treatment, traditionally, intravenous Vancomycin has been the agent of choice, but alternate IV antibiotics are now available (Table C). Antibiotic therapy should be adjusted accordingly, based upon culture and susceptibility data.

As the patient shows sustained improvement, and per culture and sensitivity data of the bacterium, a decision can be rendered to convert to an active oral agent, or to complete the antibiotic therapy with home or outpatient infusion antibiotics. The duration of antibiotics for severe infections is guided by clinical response and tissue involvement (i.e. exclusion of underlying osteomyelitis).

the microbiology laboratory to look for *Staphylococcal aureus* organisms, specifically to rule out “nasal carriage” of this organism.

It is also important to reinforce hygiene with patients, as *Staphylococcal aureus* “pus” is highly contagious and easily transmitted to other body locations and to inattentive family members. An attempt to eliminate *Staphylococcus* from identified *Staphylococcal aureus* nasal carriers (including MRSA) can be undertaken by the application of mupirocin (Bactroban) ointment to each nostril twice daily for five days or more, with or without systemic-culture-directed antibiotics, and bathing with chlorhexidine, povidone-iodine or a dilute bleach solution. Although these measures are tried, there have been no clinical trials to support the effectiveness of treatment regimens.

Community-acquired MRSA is an organism that poses many diagnostic and therapeutic challenges. The presenting history and physical findings may initially resemble an insect bite with localized itching, minor localized inflammation, and progressing to inflamed, necrotic tissue with abscess formation. Culture data will quickly confirm the true nature of these lesions. In your practice area, information regarding the prevalence and antibiotic sensitivity of MRSA among *Staphylococcus aureus* isolates are available from your hospital’s published “antibiogram” or hospital microbiology department. In addition to your clinical recognition and laboratory confirmation of community-acquired MRSA lesions, antibiogram information may present hints for empiric antibiotic selection while you are waiting for the results of the *mandatory* lesion culture of course, the lesion just might be a “Brown Recluse” spider bite....but that is another story. ➤

TABLE B

Diagnosis and Management of Community-Acquired MRSA

- Exclude institutional or hospital-acquired MRSA
- Mandatory lesional culture (and clinical follow up)
- Incision and drainage of accumulation “pus”

TABLE C

Antibiotic Selection for the Treatment of MRSA

Intravenous Antibiotics

- Vancomycin
- Linezolid (Zyvox)
- Daptimycin (Cubicin)
- Quinupristin/Dalfopristin (Synercid)
- Teicoplanin (Targocid)
- Tigecycline (Tygacil)

Oral Antibiotics

- Trimethoprim-Sulfamethoxazole (Bactrim)
- Linezolid (Zyvox)
- Clindamycin
- Tetracycline (Minocycline, Doxycycline)

Topical (Nasal carriers, lesional agent)

- Muprin, Fucidin

Staphylococcus Aureus Carriage and Containment

Recurrent *Staphylococcal* soft-tissue infections are rarely the result of an undiagnosed immune deficiency state especially for the adult. (Exclude HIV infections- discussions of “rare” immune deficiency states are beyond the scope of this article.) Persons with multiple and/or recurrent soft-tissue lesions or family members who are afflicted with the same type of community-acquired MRSA infections should be evaluated for possible *Staphylococcal aureus* carriage and thereby targeted for elimination therapy. Evaluation of this “at risk” population is best conducted through the use of a bilateral anterior nare culture (performed by gently swabbing the anterior portion of each nostril with a cotton culture swab) and direct communication to

MDCH Offers Vital MRSA Education Materials

Methicillin Resistant *Staphylococcus aureus* (MRSA) is a type of “staph” bacteria that is resistant to certain antibiotics. It can be difficult to diagnose and even more difficult to cure. Of great concern is the fact that while MRSA has been present in health care settings for a number of years, it is growing in prevalence in the community setting, which has led to its name community-acquired Methicillin Resistant *Staphylococcus aureus*.

MRSA outbreaks are reported to the Michigan Department of Community Health (MDCH) from a variety of health care settings including various hospital units (intensive care, neonatal intensive care, critical care, surgical, burn) and facilities such as long-term care, rehabilitation, and dialysis centers, and from community settings such as schools (high schools, grade schools, schools for developmentally delayed, and daycare centers), sports teams (university football, wrestling, and field hockey, as well as high-school football and wrestling), correctional facilities throughout the state and individuals living within the same household. With that reporting, MDCH has found that MRSA infections in the community setting have greatly increased in Michigan in the past two years.

In response to the increase in MRSA infections, and the continuous calls taken by the MDCH Antimicrobial Resistance Program, as well as the great need for information about MRSA, MDCH in collaboration with the Michigan Antibiotic Resistance Reduction (MARR) Coalition offers a newly published brochure titled “MRSA: What You Should Know” and a poster “Protect Yourself From MRSA and Other Infections.”

The purpose of these educational materials is to provide the basic and necessary information to empower Michigan residents to be able to understand, recognize, control, and prevent acquisition and transmission of MRSA infections. This straightforward information will be useful for osteopathic physicians, their medical and practice management staff and ultimately their patients to help combat the increasing number of MRSA infections. These MRSA materials are intended for use in all areas of the health care continuum including the physician/patient relationship. These brochures will be available for download by the end of August on the MDCH www.michigan.gov/mdch and the MARR www.reduce misuse.org websites.

Community-Acquired Methicillin Resistant *Staphylococcus Aureus*: Attack of the Spiders? *Continued from page 19*

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