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Commissioner of Health

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SPIDER BITE? THINK MRSA

In the United States, *Staphylococcus aureus* is the most common cause of skin and soft tissue infections. Methicillin-resistant *Staphylococcus aureus* (MRSA) is resistant to β -lactam antibiotics, including penicillinase-resistant penicillins (methicillin, oxacillin, nafcillin) and cephalosporins, and has long been a recognized pathogen among hospitalized patients and persons with certain healthcare-associated risk factors. In Tennessee, there has been a dramatic increase in the frequency of MRSA infections among otherwise healthy persons without typical healthcare-associated MRSA (HA-MRSA) risk factors. These MRSA infections are referred

to as community-associated MRSA (CA-MRSA).

CA-MRSA infections have been defined as MRSA infections acquired by persons, who within the past 12 months, have not been hospitalized nor have undergone a medical procedure (such as dialysis, surgery, catheters). In contrast to HA-MRSA, CA-MRSA frequently is susceptible to trimethoprim-sulfamethoxazole, clindamycin, and tetracycline. Outbreaks of CA-MRSA have been described in inmates of correctional facilities, intravenous drug users, athletic teams and men who have sex with men. Close skin-to-skin con-

tact, non-intact skin (cuts and/or abrasions), contaminated items and surfaces, crowded living conditions and poor hygiene (e.g., sharing of unwashed bath towels) have been identified as factors associated with spread of CA-MRSA.

MRSA infections in the community are usually manifested as skin infections, such as pimples and boils, and occur in otherwise healthy people. Local skin necrosis mimicking "spider bites" may occur (due to expression of the Panton-Valentine-Leukocidin (PVL) toxin commonly carried by strains of CA-MRSA).

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NEISSERIA MENINGITIDIS AND THE NEW MENINGOCOCCAL VACCINE

Since the introduction of routine childhood vaccination against *Haemophilus influenzae* type B (HIB) and *Streptococcus pneumoniae*, *Neisseria meningitidis* has become a leading cause of bacterial meningitis in the United States¹. *N. meningitidis* colonizes the nasopharynx and is spread by direct contact with large droplet respiratory secretions of asymptomatic carriers or infected persons. Although contagious, >98% of cases in the United States occur sporadically, not associated with outbreaks. Disease is caused by 5 major serogroups: A, B, C, Y, and W-

135. Unpublished data from the CDC collected in 2004 estimates a rate of meningococcal disease (including septicemia and meningitis) in the US of 0.5-1.1/100,000 population. The case fatality ratio is 10-14%, while 11-19% of survivors suffer permanent sequelae. Rates of meningococcal disease vary by age (Figure 1), with the highest rates among children under one year of age; however, >50% of cases in this age group are caused by serogroup B, which is not vaccine-preventable. A second peak occurs during middle and late adolescence; studies

have demonstrated rates of 5.1/100,000 persons among college freshmen living in dormitories. Fortunately, 75% of cases in people over age 11 are caused by serogroups C, Y, and W-135, which are all potentially vaccine-preventable.

Meningococcal disease is a notifiable disease in Tennessee, reportable to local health departments. Close contacts should be provided appropriate chemoprophylaxis, and health departments can help provide this as appropriate.

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SPIDERBITE? THINK MRSA (CONTINUED)

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Suspect MRSA infection whenever the differential diagnosis includes spider bite.

CLINICAL MANAGEMENT OF SKIN AND SOFT TISSUE INFECTIONS (SSTI)

Clinical management of SSTI should be determined by the clinical presentation, severity of the infection, the presence of co-morbidities and presence of risk factors for CA-MRSA or HA-MRSA^{1,2}. **Incision and drainage (I & D) is extremely important in treatment of abscesses and should be done whenever possible.** Fluctuant abscesses should always be treated with I&D and never with antibiotic therapy alone.

If there is no evidence of systemic toxicity (e.g., fever) and no uncontrolled co-morbidities [e.g., peripheral vascular disease, diabetes mellitus, chronic venous insufficiency, morbid obesity] that may complicate treatment, patients may be treated with I&D and local wound care alone.

Antimicrobials should be considered if I&D is not possible (e.g., the lesion is not fluctuant), the patient is systemically ill (e.g., fever is present) or has any of the above co-morbidities. Depending on degree of illness and co-morbidity these patients may require initial hospitalization and parenteral antimicrobials with subsequent conversion to oral therapy once signs and symptoms of infection are improving. Outpatients should be monitored carefully for response to initial oral therapy.

Options for empiric oral antimicrobial therapy for CA-MRSA include trimethoprim-sulfamethoxazole, clindamycin or a tetracycline. Rifampin or quinolones should NEVER be used alone, even if the isolate is susceptible, because of the rapid development of resistance to these agents. Antimicrobial therapy should be adjusted based on culture and susceptibility results. It is important to note that Group A streptococci (GAS) are

another common cause of skin and soft tissue infections particularly cellulitis and impetigo. If GAS infection is suspected, therapy should include an agent active against this organism (β -lactam, macrolide, clindamycin). Tetracyclines and trimethoprim-sulfamethoxazole, although active against many MRSA, are not recommended treatments for suspected GAS infections.

Hospital admission is indicated for the following scenarios: life-threatening infection such as necrotizing fasciitis, sepsis syndrome, or patients who appear toxic [e.g., tachycardia, tachypnea, hypotension, altered mental status], or non-toxic, but with unstable co-morbidities that may complicate therapy. Empiric broad-spectrum parenteral antimicrobial coverage active against MRSA, including vancomycin should be commenced. Surgical intervention may be necessary (e.g., MRSA pneumonia frequently is complicated by empyema or abscess formation). Infectious disease specialists should be consulted if the patient does not improve or alternative antimicrobials (e.g., linezolid) are being considered.

Invasive MRSA [i.e., MRSA isolated from blood, cerebrospinal fluid (CSF), pericardial, pleural or joint fluids, organs, and bone] is a reportable condition in Tennessee.

ERADICATION OF MRSA COLONIZATION (DECOLONIZATION)

Treatment to eradicate MRSA colonization is not routinely recommended. The efficacy of decolonization in the outpatient setting and the optimal regimen has not been established. Nevertheless, it may be reasonable to consider decolonization for (i) patients with recurrent MRSA infections despite appropriate therapy, and (ii) ongoing MRSA transmission in a well-defined cohort (e.g., household) with close contact.

Treatment regimes that have been used include: (1) Oral antimicrobials (usually rifampin and trimethoprim-sulfamethoxazole, or rifampin and doxycycline, or rifampin and minocycline) and/or (2) Nasal decolonization with

intranasal topical mupirocin (bid for 5 days) and (3) Skin antiseptics (e.g. chlorhexidine baths).

INFORMATION FOR CAREGIVERS AND PATIENTS WITH MRSA INFECTION

Patients with MRSA infections, their family members and close contacts should be thoroughly counseled about measures to prevent spread of infection. Drainage from *S. aureus* infections, wound dressings and other materials contaminated with wound drainage are highly infectious.

Infection control messages for patients to prevent transmission of *S. aureus* SSTI, including MRSA include: (1) Keep wounds and lesions covered with clean, dry bandages. This is especially important when drainage is present. (2) Wash hands with soap and warm water or alcohol-based hand rub after touching infected skin and bandages. Put disposable waste (e.g., dressings, bandages) in a separate trash bag and close the bag tightly before throwing it out with the regular garbage. (3) Advise family members, other close contacts to wash their hands frequently with soap and warm water, especially if they change your bandages or touch the infected area or anything that might have come in contact with the infected area. (4) Consider using clean, disposable, nonsterile gloves to change bandages. (5) Do not share personal items (e.g., towels, washcloths, razors, clothing, or uniforms) or other items that may have been contaminated by wound drainage. (6) Disinfect all non-clothing (and non-disposable) items that come in contact with the wound or wound drainage with a solution of one tablespoon of household bleach mixed in one quart of water (must be prepared fresh each day) or a store-bought, household disinfectant. (7) Wash soiled linens and clothes with hot water and laundry detergent. Drying clothes in a hot dryer, rather than air-drying, may also help kill bacteria in clothes. (8) Wash utensils and dishes in the usual manner with soap and hot water or using a standard home dishwasher. (9) Avoid participating in contact sports or other skin-to-skin contact until the infection has healed. (10) Be sure to tell any healthcare providers who treat you that you have MRSA, a "resistant staph infection".

¹Dellit T, Duchin J, Hofmann J, Gurmai Olson E, Interim guidelines for evaluation & management of community-associated methicillin-resistant *Staphylococcus aureus* skin and soft tissue infections in outpatient settings, September 2004. <http://www.metrokc.gov/health/providers/epidemiology/MRSA-guidelines.pdf>.

²Eron LJ, Lipsky BA, Low DE, et al. Managing skin and soft tissue infections: expert panel recommendations on key decision points. *J Antimicrob Chemother.* 2003;52(Suppl 1):13-17.

NEISSERIA MENINGITIDIS AND THE NEW MENINGOCOCCAL VACCINE (CONTINUED)

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Screening cultures of contacts are not recommended. In 2004, 22 cases of meningococcal disease were reported to the Department of Health, of which 6 were among persons 12-25 years. The Department of Health performs active surveillance for meningococcal disease in metropolitan areas of the state, and is currently involved in a CDC-sponsored statewide case-control study of meningococcal meningitis among high school students.

A quadrivalent meningococcal polysaccharide vaccine for serogroups A, C, Y, and W-135 has been licensed in the United States since 1981 and is produced by Sanofi Pasteur and marketed as Menomune®. This vaccine is effective in persons aged 2 years and older, but immunity is short lived and responses to serogroups vary; antibody levels decrease substantially within 3 years and revaccination is recommended for those remaining at risk of disease after 3-5 years. While the polysaccharide vaccine prevents disease, it does not eliminate nasal carriage of the bacteria and has no impact on herd immunity. Because of these limitations, the vaccine has only been recommended for limited populations, including persons with high risk medical conditions (asplenia, terminal complement component deficiencies), those with occupational exposure to bacterial isolates, college freshmen living in dormitories, military recruits, and travelers to high risk areas.

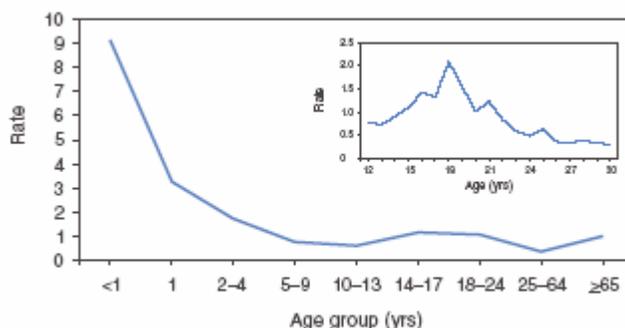
In the spring of 2005, Sanofi Pasteur received FDA-approval for a new quadrivalent meningococcal conjugate vaccine (Menactra®) effective against serogroups A, C, Y, and W-135 in people aged 11-55 years. This vaccine exhibits features that make it a great improvement over the older vaccine: it elicits longer term protection and is expected to improve herd immunity because of its ability to substantially reduce nasal carriage of the bacteria. Based upon these features, the Advisory Committee on Immunization Practices (ACIP) recently published new meningococcal vaccine recommendations designed to reduce the elevated incidence of meningococcal disease among healthy adolescents and young adults.

The ACIP recommends that the new conjugate vaccine be given as a single dose to all children aged 11-12, children entering high school (~15 years), and others aged 11-55 years previously recommended to receive the polysaccharide vaccine, such as college freshmen living in dormitories. In the absence of the new vaccine, the polysaccharide vaccine should be used for college students living in dorms and could be considered by others wanting to reduce

their risk. However, the polysaccharide vaccine should not be used routinely for younger teens with no other risk factors because a repeat dose or conjugate vaccine would be needed before college.

Conjugate vaccine production is not yet at full capacity; however, Sanofi Pasteur anticipates being able to meet public demand for the vaccine. Although the disease is uncommon and the retail price is \$82.00 per dose, interest is expected to be strong among parents, as concerns are fueled by the publicity generated by cases of sudden illness and death in otherwise healthy teenagers. As of July 2005, the new conjugate vaccine will be available through the federal Vaccines for Children (VFC) Program for VFC-eligible TennCare and uninsured children.

FIGURE 1. Rate* of meningococcal disease, by age — United States, 1991–2002



Source: Active Bacterial Core surveillance data.
* Per 100,000 population.

¹Centers for Disease Control and Prevention. Prevention and Control of Meningococcal Disease Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2005;54(No. RR-7). 1-21.

PERTUSSIS: PREVENTION OF PERILOUS PERSISTENT PAROXYSMS A PRIORITY (AND NOW WITHIN REACH)

The incidence of pertussis, or whooping cough, in the U.S. has risen over 10-fold since 1980 (Figure)^{1,2} to the highest level since the early 1960s.³ Prior to the 1940s, pertussis caused over 270,000 severe illnesses and 10,000 deaths per year in the U.S.⁴ Pertussis is the only vaccine-preventable disease increasing in incidence in this country. The most dramatic increases in rates are among adolescents and young adults, in large part due to waning immunity after routine childhood immunization.

The incubation period for *Bordetella pertussis* is generally 7-10 days. Illness is typically manifest in three stages. The catarrhal stage involves insidious onset of low-grade fever, sneezing, runny nose, and a mild cough which worsens over 1-2 weeks. During the ensuing paroxysmal stage, bursts of numerous rapid coughs are often followed by a characteristic high-pitched inspiratory whoop followed by vomiting and fatigue. This phase may persist up to 10 weeks. Gradual recovery

occurs over 2 to 3 weeks during the convalescent stage. Very young infants may develop pneumonia, encephalopathy and nutritional problems. The case fatality rate is 0.2%, with 90% of those deaths occurring in infants less than six months of age.⁵

Adolescents and adults generally have milder symptoms than infants, though half of adults with pertussis may have a

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PERTUSSIS: PREVENTION OF PERILOUS PERSISTENT PAROXYSMS A PRIORITY (AND NOW WITHIN REACH) (CONTINUED)

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cough persisting over 100 days.⁶ Several studies have shown that 13%-32% of adolescents and adults with a cough illness lasting greater than six days have pertussis.⁴ In up to three-fourths or more of cases among infants, the source may be older family members.³

DIAGNOSIS

The gold standard test for confirmation of pertussis infection is culture of the organism. A nasopharyngeal aspirate is preferred, or a swab specimen from the posterior nasopharynx (not throat), using a Dacron or calcium alginate swab (not cotton), plated on selective Regan-Lowe medium. Culture is recommended for persons presenting within 3 weeks of symptom onset.⁴ Polymerase chain reaction (PCR) can identify the organism longer after onset than culture. Calcium alginate swabs should not be used for PCR; Dacron swabs may be used for both culture and PCR. PCR testing is not well-standardized, and should be performed with rigid quality control, with culture performed as well. PCR and culture are available at the Tennessee Department of Health state laboratory free of charge, by

arrangement through county and regional health departments. Direct fluorescent antibody testing (DFA) has low sensitivity and specificity and is not currently recommended.⁴ Testing of serum antibodies can be problematic, and must be interpreted with caution. Some research studies have been performed using single IgG titers from well-standardized specialty laboratories. These tests are not available commercially, and currently the usefulness of serologic diagnosis of acute pertussis in practice is limited. CDC does not recognize serologic testing for confirmation of cases.

TREATMENT

The CDC currently recommends 14 days of erythromycin for treatment of pertussis, though several studies have shown that azithromycin and clarithromycin are as efficacious and better tolerated.⁴ Treatment within four weeks of onset of symptoms is probably reasonable to limit transmission, though treatment after the first week is unlikely to shorten the clinical course. Contacts of infectious cases exposed within the previous 3 weeks may be treated with prophylactic regimens similar to those for active disease.

PREVENTION

In mid-2005, the FDA approved the first pertussis vaccines for use in the U.S. in persons over the age of seven. Both are combined tetanus, diphtheria and acellular pertussis boosters; Boostrix (GlaxoSmithKline) is approved for use in persons 10-18 years of age, and Adacel (Aventis Pasteur) is approved for persons 11-64 years of age. It is expected that the Advisory Committee on Immunization Practices (ACIP) will soon develop recommendations for routine adolescent immunization against pertussis at 11-12 years of age. It is hoped that with institution of such policies in the U.S. the recent rise in disease incidence here will be reversed.

Pertussis should be considered in the differential diagnosis of patients with persistent cough illness, and appropriate testing should be performed for confirmation. All cases of pertussis should be reported to local health department authorities, who can assist with appropriate investigation of the source and prophylaxis of at-risk contacts. Immunization of adolescents and at-risk adults with newly approved pertussis vaccines will help control the resurgence of this disease.

¹Centers for Disease Control and Prevention. Summary of notifiable diseases. *MMWR* 2005;52 (No. 54):1-85.

²Centers for Disease Control and Prevention. Provisional cases of selected notifiable diseases, United States, week ending January 1, 2005. Centers for Disease Control and Prevention, Atlanta, GA . 2005. 6-14-2005.

³Edwards KM. Overview of pertussis: focus on epidemiology, sources of infectino, and long term protection after infant vaccination. *Pediatr Infect Dis Journal* 2005;24:S104-S108

⁴Hewlett EL, Edwards KM. Pertussis- not just for kids. *N Engl J Med* 2005;352:1215-1222.

⁵Centers for Disease Control and Prevention: *Epidemiology and Prevention of Vaccine-Preventable Diseases*, Atlanta, GA, CDC; 2002:59.

⁶Marchant CD. The 100-day cough: the time for prevention has arrived. *Clin Infect Dis* 2005;39:1581-1582.



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