Methicillin-Resistant Staphylococcus aureus, HIV Infection, and Managed Care

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Methicillin-resistant Staphylococcus aureus (MRSA) first came to the attention of health care providers as a nosocomial pathogen. More recently, MSRA has emerged as an important community-acquired pathogen and has been a cause of infection in men who have sex with men (MSM) and in persons with HIV-1 infection. Other reports include clusters of MRSA infection in prison inmates, military recruits, and athletes.

This month’s column reviews some of the more recent data on community-acquired MRSA with a focus on the problem of this infection in ambulatory settings, including in patients with HIV/AIDS.

BACKGROUND
Recent reports emphasize that antimicrobial resistance is an increasing problem outside hospitals. Klevens and colleagues used data from the Active Bacterial Core Surveillance Network to estimate the rate of invasive (ie, bloodstream or other sterile site) MRSA infections in the United States in 2005. The rate of invasive MRSA infections was 31.8 per 100,000 persons. To put this number into context, the estimated rate of invasive MRSA infections was greater than the combined rate in 2005 of invasive pneumococcal disease (14.1 per 100,000), invasive group A streptococcal infection (3.6 per 100,000), invasive meningococcal disease (0.35 per 100,000), and invasive Haemophilus influenzae infection (1.4 per 100,000). They also reported that among 5287 patients hospitalized with MRSA infection during 2005, there were 988 deaths; based on these data, the authors estimated that 18,650 patients died of invasive MRSA infection in the United States in 2005. If their projection is accurate, these deaths would exceed the total number of deaths attributable to HIV/AIDS in the United States during that year.

Invasive MRSA is only the tip of the drug-resistance iceberg. A study from the CDC found that 6% of community-associated MRSA infections were invasive. In a pediatric study, 9% of children hospitalized in 2003 for community-associated MRSA infection had invasive disease. Therefore, the total burden of MRSA may be more significant than previously thought.

The USA300 clone and, to a lesser extent, the USA400 variant have emerged as the predominant causes of community-onset Staphylococcus aureus skin and soft tissue infections. According to King and colleagues, empirical use of agents that are active against community-acquired MRSA, usually trimethoprim/sulfamethoxazole or vancomycin (not erythromycin or β-lactam antibiotics), is warranted for patients presenting with serious skin and soft tissue infections.

MSM AND MRSA
A recent retrospective review by Diep and associates of MSM in San Francisco and Boston concluded that infection with multidrug-resistant USA300 MRSA is common among MSM, and multidrug-resistant MRSA infection might be sexually transmitted in this population. However, specific sexual behaviors were not assessed or documented in clinic charts, so it was not possible to comment on the association between multidrug-resistant USA300 infection and specific sexual practices of MSM.

In this review, the overall incidence of multidrug-resistant USA300 infection in San Francisco was 26 cases per 100,000 persons (95% confidence interval, 16 to 36 cases per 100,000 persons). The incidence was higher in 8 contiguous postal zip codes, with a higher proportion of male same-sex couples. Sexual activity of male same-sex couples was a risk factor for multidrug-resistant USA300
infection (relative risk [RR], 13.2; \( P < .001 \)) independent of past MRSA infection (RR, 2.1; \( P = .007 \)) or clindamycin use (RR, 2.1; \( P = .007 \)). The risk seemed to be independent of HIV infection, however. In San Francisco, multidrug-resistant USA300 manifested most often as infection of the buttocks, genitals, or perineum. In a cross-sectional study in Boston, the USA300 strain was recovered exclusively from MSM.

In an accompanying editorial from the CDC, Gorwitz and colleagues\(^4\) noted that the review by Diep and colleagues did not assess specific sexual practices and therefore could not determine the relative importance of particular sexual practices in relation to genital or perianal MRSA colonization and infection. Furthermore, they noted that Diep and coworkers did not assess 2 important parameters in defining an infection as sexually transmitted: whether sexual activity is the predominant mode of transmission in the populations studied and whether mucosal (genital, anal, oral) contact is specifically implicated. Despite this, the editorial does highlight the fact that MSM self-identification is associated with an increased risk of having a USA300-positive isolate. They emphasize that because *S. aureus* is known to be transmitted through skin-to-skin contact, the frequency and duration of intimate skin-to-skin contact occurring with sexual activity may increase the risk of its cutaneous transmission.

This CDC editorial supports the conclusion by Diep and colleagues that further research is needed to determine whether existing efforts to control epidemics of other sexually transmitted infections can control the spread of community-associated multidrug-resistant MRSA.\(^3\)

In an earlier retrospective review of military personnel with HIV/AIDS, Crum-Cianflone and coworkers\(^5\) found that persons with HIV/AIDS have an approximately 18 times higher risk of developing community-acquired MRSA infection than the general population. All infections were skin and soft tissue infections, with 38% of them scrotal skin infections. In multivariate analysis, the strongest associations with community-acquired MRSA infection were recent treatment with a -lactam antibiotic and syphilis. The association with recent antibiotic use is not surprising and probably represents an important risk for the development of resistance. However, syphilis, as a marker of high-risk sexual activity, creates more questions than answers in terms of the role of sexual contact as a risk factor.

**INFECTION CONTROL**

The CDC offers specific infection control guidance, including recommendations for ambulatory settings.\(^{15,16}\) The success of implementing standard precautions, first recommended in earlier CDC guidelines, has been reaffirmed as the foundation for preventing transmission of infectious agents in all health care settings.
New additions to the CDC’s current recommendations for standard precautions are respiratory hygiene/cough etiquette (eg, coughing into fabric instead of hands) and safe injection practices, including the use of a mask when performing certain high-risk, prolonged procedures involving lumbar punctures (eg, myelography, epidural anesthesia).

The emphasis on respiratory hygiene/cough etiquette grew out of observations during outbreaks of severe acute respiratory syndrome (SARS) where failure to implement simple source-control measures with patients, visitors, and health care personnel with respiratory symptoms may have contributed to SARS coronavirus transmission.

In their editorial, Gorwitz and colleagues also discuss strategies for optimizing prevention and control of community-acquired MRSA infection. For example, people should avoid contact with infected skin and potentially contaminated objects. Based on current consensus from a panel of experts, they discourage postexposure prophylaxis for asymptomatic persons who have had contact with MRSA-infected persons, the routine use of screening for MRSA colonization, and the use of agents to suppress or eliminate colonization for infected persons or their symptomatic contacts, although the potential role of these interventions in specific at-risk populations is being evaluated.

Because antibiotic exposure may facilitate the acquisition of drug-resistant strains of *S aureus*, clinicians should take the time-honored approach of using antimicrobial agents prudently. In addition, the importance of frequent hand washing by health care workers needs to be stressed as an important line of defense against MRSA.

**INFORMATION FOR PATIENTS**

There is considerable anxiety in the general population associated with the risk of MRSA infection. Recent press reports do little to put the issue into perspective. A summary of some of the responses to the report by Diep and colleagues has been published on the Internet, which underscores the confusion associated with a lack of detail when reporting health information to the public.

Despite the increase in media coverage, MRSA infection is not new and has been seen in inpatient settings since the 1950s. Its appearance in the community is new, however, and should be a part of the physician-patient discussion. While necrotizing fasciitis with MRSA has been reported—leading to the popular perception of its “flesh-eating” character—this is still relatively uncommon. The other key unknown is whether the number of infections has dramatically increased or whether this...
infection has just been relatively highly publicized. Clearly, the central approach to prevention of MRSA infection in the community is personal hygiene and prudent antibiotic use as recommended by the CDC.\textsuperscript{15,16}

Finally, providers should be aware of such organizations as the Alliance for the Prudent Use of Antibiotics, an independent organization whose mission is to improve antibiotic policy and clinical practice worldwide (see \url{www.tufts.edu/med/apua}). The Table lists some of the organization's provider-level considerations to minimize the risk of antibiotic resistance.

References:


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Internet Resource Note
The Association for Professionals in Infection Control and Epidemiology (APIC) has been on the forefront of MRSA prevention and control. Their Web site contains a number of documents, slide sets, and other data relevant to the MRSA problem. Available at: www.apic.org

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