

HEALING HANDS

Vol. 10, No. 5 ■ December, 2006



Homeless People at Higher Risk for CA-MRSA, HIV and TB

*Homelessness increases one's risk for infectious diseases and complicates access and adherence to treatment. Three infectious agents that disproportionately affect homeless populations — community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA), the human immunodeficiency virus (HIV), and *Mycobacterium tuberculosis* (TB) — are the focus of this issue of Healing Hands, which highlights recent research on screening, treatment and adherence strategies found to be successful in preventing and arresting these potentially virulent diseases in homeless populations.*

CA-MRSA Community-associated (or acquired) methicillin-resistant *Staphylococcus aureus* has recently emerged as a major cause of skin infections in the U.S. At the 2006 Interscience Conference on Antimicrobial Agents and Chemotherapy, MRSA (primarily the USA 300-0114 strain) was identified as the “pathogen *du jour*” because it has “exploded” worldwide over the past 6 years (Bartlett 2006; Moellering 2006). The Association for Professionals in Infection Control recently launched a comprehensive initiative to fight MRSA, calling it the “superbug.”

MRSA infections were first described in the early 1980s, but it was not until the mid 1990s that reports of community-associated MRSA infections occurring in patients without identifiable risk factors began to appear in the U.S. (Frazee 2005). The sentinel event was a series of fatal CA-MRSA infections in Native American children in the Midwest, attributed to a MRSA strain known as USA 400.

Since then, studies of urban hospitals and community settings have found that large proportions of reported skin and soft tissue infections (SSTIs) are caused by MRSA, mostly community-associated (Moran et al. 2006; Frazee 2005; Charlebois 2002). One study of SSTIs in 11 city emergency departments across the U.S., for example, found a prevalence of 59 percent MRSA; 74 percent of the MRSA infections were the USA 300-0114 strain (Moran et al. 2006). These authors also found considerable regional variation, with prevalence ranging from 15 to 74 percent overall.

To date, cases of CA-MRSA infection are more common to children and young adults; prevalence is higher among individuals who are members of racial/ethnic minorities and those with low socioeconomic status (Gorwitz, 2006). Research on MRSA in urban populations, though inconsistent on several risk factors, indicates higher risk for individuals with histories of homelessness,



Photo/Toledo-Lucas County Health Department

Pustules resulting from a methicillin-resistant *Staphylococcus aureus* skin infection in a tattoo recipient – Ohio, 2005 (Long et al., 2006)

incarceration, frequent emergency department visits, and injection drug use (Frazee 2005; Gilbert 2006; Beam and Buckley 2006; Young et al. 2004; Charlebois 2002).

HCH providers confirm an apparent increase in MRSA over the past few years in homeless clinics and shelters. Higher rates of hospitalization, HIV infection, and injection drug use, as well as crowded living conditions and/or poor hygiene place homeless people at higher risk for acquisition and transmission of CA-MRSA (Charlebois 2002; Pan et al. 2005).

HIV More than one million individuals in the U.S. are living with HIV, and 40,000 new infections are expected to occur this year. About one-quarter of those infected with HIV and as many as half of some subpopulations are undiagnosed and may unknowingly spread HIV to partners. Prevalence of HIV is generally estimated to be at least 3 times higher among people who are homeless than in the general population. In New York the rate of new HIV diagnoses is

reported to be 16 times higher. One-third to one-half of individuals living with AIDS are estimated to be homeless or at risk of homelessness (Conanan et al. 2003).

TB The incidence of tuberculosis in the U.S. has steadily declined since 1992, the final year of the latest resurgence. The 14,097 cases reported in 2005 represent a decrease of 2.9 percent since 2004 and a 47 percent decrease since 1992. Cases in 4 states (CA, TX, NY, and FL) comprised nearly half (48%) of the 2005 case total (CDC 2005). But because tuberculosis is primarily a disease of poverty and crowding, the prevalence of this disease among urban homeless populations is disproportionately high and emergency shelters remain volatile transmission sites.

Of all TB cases reported in the US between 1994 and 2003, over 6 percent were among persons classified as homeless during the 12 months prior to diagnosis (Haddad et al. 2005; CDC 2005). A recent survey of over 100,000 individuals in New York who had spent at least one night in a homeless shelter found the prevalence of TB infection to be 11 times higher than in the general population (Santora 2006).

COMORBID HIV & TB Of particular concern is the comorbidity of HIV and TB. Because HIV infection severely strains the immune system, people dually infected with HIV and TB have 100 times greater risk of developing active, infectious tuberculosis than do

people with inactive (“latent”) TB who are not infected with HIV. The CDC estimates that 10 to 15 percent of all TB cases and nearly 30 percent of TB infections among people 25–44 years of age occur in HIV-infected individuals.

As many as one-third (34%) of TB-infected homeless persons nationwide are co-infected with HIV (Haddad et al. 2005). Clinicians are urged to have “a high index of suspicion for TB in a homeless patient who has tested positive for HIV” (Barker et al. 2006). The CDC explicitly notes that any acceleration in the natural elimination of tuberculosis would necessitate prevention efforts targeting at-risk populations, including “persons living with HIV, and persons living in poverty with limited access to medical care and adequate housing and nutrition” (Exec Commentary 2005).

People with HIV/AIDS are also at higher risk of developing multiple drug-resistant TB (MDR TB), which results from inconsistent or partial treatment. In October 2006, the World Health Organization convened a meeting to develop a response to an even more ominous threat—extensively drug-resistant tuberculosis (XDR TB), defined as TB with extensive resistance to second-line drugs. XDR TB has been declared “virtually untreatable.” In the U.S., patients with XDR TB are 64 percent more likely to die during treatment than are patients with MDR TB. The emergence of XDR TB reinforces the need for vigilance in screening for TB and HIV.

Preventing Infection & Transmission of Disease

MRSA EDUCATION & TRAINING

Acknowledging that MRSA is a “fairly significant” problem in their homeless shelter, **Annie Nicol, FNP, PA** of the Petaluma Health Center in Sonoma County, CA, emphasizes that early identification and prevention are critical to controlling MRSA transmission. Nursing staff provide education about germs, demonstrate sneezing and hand washing techniques, and display visual images of MRSA infections—which is particularly helpful for clients who have difficulty reading or who might otherwise ignore what commonly look like “spider bites.”

When a couple of MRSA cases appeared in homeless family shelters this fall, **Elizabeth Browning, RN**, Infectious Control Nurse for the Philadelphia Health Management Corp., said it brought home the need to educate staff and clients about wounds and wound care. She tries to determine how shelter staff can be “practitioners of infection control” because “it takes everybody to do this.” “Infection control will become even more important as

the prevalence of MRSA increases,” warns Ms. Browning. “I can’t stress enough the importance of hand washing.”

PREVENTING MRSA SKIN INFECTIONS

1. Keep your hands clean by washing thoroughly with soap and water or using an alcohol-based hand sanitizer.
2. Keep cuts and scrapes clean and covered with a bandage until healed.
3. Avoid contact with other people’s wounds or bandages.
4. Avoid sharing personal items such as towels or razors.

CDC Guidelines: “Community-Associated MRSA Information for the Public”

http://www.cdc.gov/ncidod/dhqp/ar_mrsa_ca_public.html

The literature confirms the value of these providers’ approaches, urging education and attention to basic hygiene and wound care to control the spread of MRSA (Allen 2006; see also Gorwitz 2006 on clinical management of CA-MRSA).

HIV SCREENING & TESTING The CDC has issued revised recommendations for HIV testing in healthcare settings, effective September 2006, in response to concerns that such a large proportion of HIV-infected individuals are unaware of their infection until they have developed symptoms. The recommendations urge HIV screening for all patients ages 13–64 years and testing of high-risk populations at least once a year. Written consent for screening and prevention counseling is no longer required as part of HIV screening programs.

Rapid testing for HIV can facilitate testing of homeless patients in non-clinical settings because results are ready in about 20 minutes. (Positive tests still require confirmation, which can take 1–2 weeks.)

A recent study assessed the use of OraQuick in a mobile health van. The test was chosen for its efficacy in a wider range of settings and temperatures. Of 1,150 tests given, all but 5 results (over 99%) were delivered to the persons tested with OraQuick, while only 50 percent of clients tested using traditional methods returned for results. Authors of adapted clinical guidelines for the care of homeless patients with HIV/AIDS assert the usefulness of rapid testing, but advise that sufficient pre-test counseling be conducted to ensure patient readiness (CN 2003).

Wayne Centrone, MD, Medical Director for Outside In, a program targeting homeless youth and young adults, has used rapid HIV 1 and 2 antibody testing for over two years. Staff provide counseling, advocacy, testing and follow-up referrals for high-risk populations in bath houses, night clubs, sex venues and on the street, as well as in a clinic for high risk MSM (men who have sex with men). "This has been a great way for us to bring a prevention message to a population that might not otherwise be open to such a message, and enables clients to ask questions about creating healthful harm reduction strategies," reports Dr. Centrone.

CDC is currently sponsoring HIV rapid testing by 7 community-based organizations across the country, targeting high-risk populations in a wide variety of non-clinical settings including outreach mobile vans, homeless shelters, and needle exchange programs. New information

from these studies will help to determine the appropriateness of this test in homeless populations and settings.

TB CONTROL Tuberculosis control demands vigilance. Ms. Nicol provides TB screening to approximately 800–900 people a year in a new, 130-bed homeless shelter in Sonoma County. She reports an overall decline in TB cases during the past year, just a few converters (from latent to active TB), and only a slight increase in MDR TB. Efforts to maintain a clean environment are partially responsible for these successes, she says. The new facility has a good air filtration system with a structure that is conducive to ventilation. The entire shelter is cleaned twice a day and "double scrubbed" every weekend.

Ms. Browning says Philadelphia shelter providers do their best to keep facilities clean and well-ventilated, but they are often constrained by budget and structural limitations. For example, "if the shelter has few windows, there's very little they can do about ventilation."

These providers also stress the importance of educating shelter staff and clients to dispel common myths about TB—e.g., that a positive test always means someone has infectious tuberculosis.

Published research reinforces the pressing need for sustained, robust TB screening and intervention programs which address multiple risk factors. One study of 415

homeless persons from Skid Row in Los Angeles found deficits in their knowledge about modes of TB transmission and risk factors for infection (Nyamathi 2004; see also Lofy et al. 2006).

Resources developed by HCH providers across the country, including adapted clinical guidelines for homeless patients and practice-based case reports, recommend TB skin tests every 6 months rather than annually for people with HIV infection who are homeless, due to their increased risk for co-infection and unpredictable follow-up (Conanan et al. 2003, Barker et al. 2006).

Studies of TB outbreaks in homeless populations underscore the complexities and challenges of prevention, especially with multiple chains of transmission. A report on a 2003 outbreak in New York recommends use of CDC's universal *Mycobacterium tuberculosis* rapid genotyping system (CDC 2005). Authors assessing another outbreak that same year in King County, WA, attributed successful transmission control to genotyping using PCR-based methods that were both rapid and cost-effective (Freeman et al. 2005; Lofy et al. 2006).

Sadly, a conclusion drawn by clinicians seven years ago remains true today: "Despite significant progress in the control of infectious TB ... the underlying causes of the resurgence ... remain unchanged" (CN, 1999).

Promoting Treatment Adherence & Continuity of Care

Living without stable housing creates a variety of barriers to treatment adherence, such as: limited access to food and water; lack of a safe place to store medications (particularly those requiring refrigeration); managing gastrointestinal side effects when restrooms and bathing facilities are not readily available; and inconsistent shelter and eating arrangements, making it difficult to adhere to a regular schedule. Mental illness and substance abuse are also significantly related to treatment non-adherence (Gordon 2006; Berg et al. 2005; Waldrop-Valverde and Valverde 2006).

The following strategies have proven to be especially effective at promoting treatment adherence and continuity of care, even under difficult circumstances:

CARE COORDINATION Case management throughout treatment, particularly when care is coordinated by an interdisciplinary team, is associated with improved adherence for HIV- or TB-infected homeless people and marginally-housed adults (Kushel et al. 2006; Haddad et al. 2005). "Relationship building, coordination of care by multiple providers, and maintaining contact with homeless clients during and after medical confinement are key to assuring treatment adherence" (Barker et al. 2006). Where possible, homeless clients should be assisted in maintaining a "medical home" for their documentation and treatment records (Conanan et al. 2003).

HCH providers stress the importance of care coordination in their work. Ms. Browning considers collaborations with other homeless agencies and outreach teams to be absolutely essential to locating

homeless clients with active TB who are lost to follow-up. "It becomes like a detective game to figure out where they've gone," she says.

Rod Heilman, MSW, who provides case management to homeless clients for the AIDS Volunteers of Cincinnati, agrees that the most important thing in assuring continuity of care is to be connected to community resources. His clients frequently complain about negative side effects of HIV medications, such as nausea and diarrhea. Regular contact with healthcare professionals is essential to their continuity of care, he says. Although clients may discontinue treatment for reasons unrelated to the treatment itself, medication side effects can be minimized if clients have more personal contact with a healthcare professional, concurs Ms. Browning.

Outreach is a critical component of care coordination for people who are homeless. A recent study in Baltimore, MD, found that homeless HIV-positive individuals with substance use disorders and persistent mental illness were successfully enrolled in integrated treatment services through outreach at shelters, soup kitchens and on the streets. The outreach team consisted of a nurse, a substance abuse counselor, and a formerly homeless person (Tommasello et al. 2006).

HOUSING Supportive housing, including respite care programs that provide interim housing following hospital discharge, are consistently effective in helping clients adhere to treatment for HIV/AIDS and TB (Buchanan et al. 2006; National AIDS Housing Coalition 2005). Research repeatedly confirms that housing is a cost-effective intervention for homeless people, regardless of individual characteristics and behaviors. Permanent supportive housing has a positive impact on prevention of disease, continuity of care, and treatment adherence. A report summarizing the National Housing and HIV/AIDS Research Summit in 2005 is aptly titled, "Housing Is the Foundation of HIV Prevention and Treatment" (National AIDS Housing Organization).

A program in Georgia that provides housing for homeless people with TB demonstrated a 97 percent compliance rate with directly observed therapy and a 91 percent completion of therapy rate among the 538 homeless clients who used their services between July 1, 1996 and June 30, 2004 (Fraser 2005).

INCENTIVES Research has shown that monetary incentives in combination with case management can improve treatment adherence rates for homeless people with latent TB (Hwang et al. 2005; Tulsy et al. 2004). A recent randomized controlled trial of treatment programs for homeless adults with latent tuberculosis infection (LTBI) found that those receiving nurse case management, education, tracking, and incentives had 3 times greater odds of completing a full 6-month course of LTBI treatment than did patients in the control group receiving only standard care plus incentives (Nyamathi et al. 2006).

RECOMMENDATIONS FOR TREATMENT OF CA-MRSA

The first challenge for the clinician in treating CA-MRSA infections is "to identify the organisms and recognize that they are resistant to the oral cephalosporins and antistaphylococcal penicillins, which have been the mainstay in treating SSTIs" (Moellering 2006).

TREATMENT OF MRSA: RECOMMENDATIONS FOR CLINICIANS

- Be aware that the prevalence of CA-MRSA is rapidly increasing in the U.S. and there is a low threshold for obtaining material for culture and susceptibility testing from community-associated abscesses and other skin infections, especially those that resemble "spider bites" with areas of necrosis.
- Know when to use drugs with activity against CA-MRSA—if the patient does not respond rapidly to appropriate drainage and standard antimicrobial agent therapy or in settings with a high incidence of CA-MRSA infections.
- In settings of more invasive infections, the clinician should immediately start therapy with vancomycin or linezolid and obtain an infectious disease consultation.

Moellering 2006

Adi Gundlapalli, MD, PhD, infectious disease specialist at the University of Utah and former Medical Director at Wasatch Homeless Health Care in Salt Lake City, advises HCH clinicians to "be aware that MRSA is on the rise." He also notes that oral medications for CA-MRSA (including bactrim, doxycycline and rifampin) can be useful, depending on local resistance patterns. (See box for other recommendations.)

ONCE-A-DAY TREATMENT FOR HIV In July 2006, the Federal Drug Administration approved Atripla, the first once-a-day, fixed-dose combination tablet of three widely used antiretroviral drugs. This is a potential "boon for HIV treatment compliance and adherence," notes Dr. Gundlapalli, but consistent access and availability of the treatment for homeless persons may be a long time in coming.

WHOLE-BLOOD TEST FOR LTBI Use of whole-blood interferon-gamma release assay (IGRA) has been recommended as an alternative to the tuberculin skin test (TST). The fact that whole-blood tests such as QuantiFERON-TB (QFT) and QuantiFERON-TB Gold do not require a return visit makes them especially appealing for homeless

QUANTIFERON TB BLOOD TEST

A whole-blood test for diagnosing latent TB infection (LTBI)

Advantages

- Single patient visit only – no return visit required
- No booster phenomenon, which can happen with repeat tuberculin skin tests (TST)
- Less subject to reader bias and error than with TST
- Assesses responses to multiple antigens simultaneously

Disadvantages

- Additional tests needed to exclude TB disease and confirm LTBI (as with TST)
- Blood samples have to be processed within 12 hours of blood draw
- Not yet approved for all patients: children <15 years; TB case contacts; pregnant; immunocompromised patients (including known HIV+)

patients. A recent study found IGRA implementation in a TB control program to be “feasible and acceptable” among homeless persons, injection drug users, and immigrant patients from 6 community clinics in San Francisco. Inclusive of phlebotomy, laboratory, and personnel costs, IGRA cost \$33.67 per tested patient (Dewan et al. 2006).

HCH practitioners, however, have mixed attitudes about the test. **Frank Alvarez, MD, MPH**, Deputy Health Officer of the Santa Barbara County Public Health Department’s Disease Control & Prevention Division, and Disease Control Manager **Paige Batson, RN, PHN**, recently collaborated with the Santa Barbara HCH clinic to use the QF-TB Gold test on a small group of homeless clients with positive tuberculin skin tests to determine the blood test’s efficacy. The QFT test ruled out “nearly all” of those individuals who had recently tested positive with the skin test. For this reason, Ms. Batson says the overall cost savings of using the test are great, even though the test is pricy. She calls the test one of their “greatest resources.” Dr. Alvarez concurs that “it’s a great test,” but adds that there are logistical limitations in the field. For example, “once you draw the serum, you have to get it to a lab within 12 hours or it’s worthless.”

Dr. Gundlapalli concurs that the logistical challenges in using this test are immense, citing the 12-hour lab restriction, high cost, and

limited availability as factors that make the QFT test difficult to use with patients who are homeless. It should also be noted that in those with impaired immune function (including HIV/AIDs), a negative QFT test alone may not be sufficient to rule out *M. tuberculosis* infection. (See box for a summary of advantages and disadvantages of the QFT test on p. 4; CDC Dec 15 05; Barker et al. 2006.)

SHORT-COURSE TREATMENT FOR LTBI A short-course treatment recommended for latent TB infection involves using 60 daily doses of rifampin and pyrazinamide. While this approach seems promising for improving treatment adherence for homeless persons, only one study has assessed this. The study included incarcerated individuals from 5 county jails (n=844) and homeless persons drawn from TB outreach clinics in 3 cities (n=367). While completion rates using the regimen exceeded historical rates using isoniazid, it also found an increased risk of significant hepatotoxicity in 6 percent of the patients. The authors conclude that it is important to seek an effective short-course treatment regimen for these populations, but recommend relying upon better known interventions to improve adherence, such as DOT and the use of incentives, until further research has been conducted (Lobato et al. 2005). ■

STRUCTURAL FACTORS LIMITING TB CONTROL

“Authorities rarely blame the recrudescence of tuberculosis on the inequalities that structure our society. Instead, we hear mostly about biological factors (the advent of HIV, the mutations that lead to drug resistance) or about cultural and psychological barriers that result in “noncompliance.” Through these two sets of explanatory mechanisms, one can expediently attribute high rates of treatment failure either to the organism or to uncooperative patients.”

— Paul Farmer, MD, *Pathologies of Power: Health, Human Rights, and the New War on the Poor*

“Many would find it scandalous that one of the world’s leading causes of preventable adult deaths is a disease that, with the possible exception of emerging resistant strains, is more than 95 percent curable, with inexpensive therapies developed decades ago.”

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Other Resources on Infectious Disease Prevention & Control:

1. Association for Professionals in Infection Control and Epidemiology, Inc.: <http://www.apic.org>
2. Centers for Disease Control and Prevention: <http://www.cdc.gov>

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