
Washington State University College of Nursing

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To the faculty of Washington State University:

The members of the Committee appointed to examine the master's project of Kalista Dubiel find it satisfactory and recommend that it be accepted.

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Abstract

Purpose: To analyze the state of the science for the recognition of CA-MRSA skin and soft tissue infections (SSTIs), optimal pharmacologic treatment, wound care management, effective environmental controls and disease education that may be utilized by health care providers in a shelter environment.

Data Sources: Published research was limited to US studies from 2006 to February, 2012 in the CINAHL, Pubmed and Cochrane databases. CA-MRSA treatment and infection control guidelines were obtained from the Washington Department of Health, Centers for Disease Control and the Spokane Regional Health District. Antimicrobial susceptibility profiles of the Spokane, WA region were obtained from Providence Associates Medical Laboratories.

Conclusions: Homeless clients in a shelter are a high risk group for CA-MRSA infection. Shelter health care providers need a comprehensive understanding of the resistance patterns in their locale as well as effective antibiotic, wound care and environmental control measures to ensure effective treatment of CA-MRSA. This knowledge will aid health care workers in their efforts to provide efficacious treatments, accurate health education to shelter clients and workers and decrease infection rates within a shelter environment.

Implications for Practice: Nurse Practitioners should have a high degree suspicion of CA-MRSA in homeless clients with SSTIs. As an acknowledged group at risk for CA-MRSA and a population often lost to follow-up, Nurse Practitioners should consider empiric CA-MRSA antibiotic treatment for this transient population. NPs must also identify local resistance, prevalence and infection patterns for CA-MRSA, and should offer antibiotics, bandage supplies and perform incision and drainage (I&D) at clinic appointments for homeless clients whenever possible. Lastly, Nurse Practitioners can combat stigmatization of shelter clients with CA-MRSA by conveying that CA-MRSA is a manageable, treatable
condition when managed by covering wounds, frequent cleansing, not sharing personal items and taking antibiotics as prescribed.

**Statement of the Problem**

Community acquired Methicillin-resistant *Staphylococcus aureus* (CA-MRSA) has emerged as a difficult problem to manage effectively in many homeless shelters. According to the Centers for Disease Control (CDC) (2008) CA-MRSA infections are defined as a specific strain of *Staph aureus* which has developed resistance to methicillin. Typically, CA-MRSA manifests as a rapidly developing skin infection such as a furuncle, carbuncle, skin soft tissue infection (SSTI), cellulitis or an abscess which may have draining pus (Ruhe, Smith, Bradsher and Menon, 2007). Less commonly, CA-MRSA has been associated with severe and invasive staphylococcal infections in the community, including necrotizing pneumonia and fasciitis. Media coverage, fear and misinformation regarding CA-MRSA has caused some shelter managers to ban clients with known CA-MRSA infections, potentially endangering an already vulnerable person.

Poor living conditions, unsafe behaviors including substance and alcohol abuse, and limited access to health care causes increased exposure to many infectious diseases for some homeless persons. Past infection control research and epidemiologic studies of homeless populations have focused on prevalence rates of HIV infection, hepatitis B and C infection, tuberculosis (TB) infection and scabies and louse infections (Badiaga, Raoult and Brouqui, 2008). Recent epidemiologic concerns regarding influenza transmission in homeless shelters has trended infection control and disease management planning efforts against this virus as well (Duchene, 2010). Infection control for CA-MRSA in homeless shelters has not been studied per se, however, the Infectious Diseases Society of America (IDSA) published comprehensive new clinical practice guidelines for CA-MRSA treatment in February 2011 (Liu, et al., 2011). These guidelines address MRSA infection control practices in household and community settings, but not homeless shelters specifically.
Many shelter health care workers are volunteer student nurses, medical students, retired providers and others who may be unfamiliar with current CA-MRSA treatment options. It is important for a shelter healthcare provider to distinguish between an infection which can be managed onsite and an infection which requires more specialized treatment. Hence, the identification of clear, evidence based and efficacious CA-MRSA treatment methods that can be utilized by shelter healthcare (HC) workers is important to protect these vulnerable populations.

The CDC has directed much attention and research towards hospital acquired MRSA (HA-MRSA) infection control, but Barnes and Sampson (2011) note that “the science of CA-MRSA and the implications for patient care by primary care nurse practitioners (PCNPs) has received less attention” than HA-MRSA (p. 24). Ruhe, Smith, Bradsher and Menon, (2007) report that community acquired MRSA strains that have been described worldwide, were found to be genetically and epidemiologically distinct from hospital acquired MRSA infections and may exhibit more susceptibility to antibiotic treatment.

The purpose of this paper is to examine the literature for evidence regarding recognition of CA-MRSA skin and soft tissue infections (SSTIs), pharmacologic treatment, wound care management, and effective environmental controls. This paper will also detail current practice in two representative shelter clinics during a four month period from January – April 2012 as an illustration of current SSTI treatment for homeless clients in one locale. This evidence from the literature will be integrated into practice principles that can be utilized by health care workers and laypeople in shelter environments.

**Theoretical Framework**

Everett Rogers developed the Diffusion of Innovation Theory (DIT) in 1962 which elucidates the adoption of innovations among individuals and organizations. Nutbeam, Harris, and Wise (2004) quote Roger’s definition of diffusion as “the process by which an innovation is communicated over time among members of a social system” (p. 24). Time, communication, a social system and an innovation are central to DIT. Nurse Practitioners (NPs) use the theoretical framework of DIT to explore health promotion innovation and adoption in terms of four main concepts, (a) the characteristics of potential adopters (b)
the rate of adoption of an innovation (c) the nature of the social system and, (d) the characteristics of the innovation.

The characteristics of the medical innovation (principles for CA-MRSA treatment/ management) and understanding the nature of the social system are central concepts to appreciating the manner in which successful implementation of evidence based CA-MRSA treatments might be implemented or rejected within a shelter environment. In their discussion of DIT, Nutbeam, Harris and Wise (2004) relate that the characteristics of innovations which most support changes in health care behaviors are innovations with compatibility, clarity, simplicity, reversibility and observability.

It is useful to consider DIT in shelter situations as a theoretical framework for a change in practice. Education and communication directed to shelter staff and clients must be compatible with existing economic and human resources. Proposed client handouts must be simple and clear and at an appropriate level. Recognition of social hierarchy within a shelter and validation of financial, emotional and worker constraints of the shelter environment are vital for successful SSTI treatment plans for homeless shelter clients.

**Literature Review**

The literature was divided into four sections: recognition of CA-MRSA SSTIs, pharmacologic treatment, wound care management, and effective environmental controls in a shelter environment. Key words used in Cochrane and PubMed were: CA-MRSA treatment, CA-MRSA infection, SSTI and CA-MRSA infection control. Articles which focused on HIV patients and pediatrics were eliminated, and research was limited to US studies from 2006 to February, 2012. In the CINAHL database, the search criterions of wound care and homeless care were added. Articles were included whose focus was outpatient or emergency patient care and the reference lists of selected research and journal articles were reviewed to identify additional sources of research studies. Other sources of information regarding CA-MRSA were obtained via the search engine Google Scholar from the Washington Department of Health, Centers for Disease Control and the Spokane Regional Health District. The most recent available (2010) antimicrobial susceptibility profile of the Spokane, WA region was supplied by Providence Associates
Medical Laboratories. Latest edition pharmacological and primary care procedural texts were reviewed as well.

**Method**

Data were gathered from two clinics which serve homeless clients; Union Gospel Mission (UGM) Clinic for men and Helping Hands Clinic for women (a branch of UGM) in Spokane, WA for a four month period from January 2012 through April 2012. The total number of clients seen at the clinic, the number with SSTIs, and the pharmacologic treatment prescribed, the utilization of incision and drainage (I&D) in treatment, and any confirmed CA-MRSA infections were noted. The data were used to document what shelter providers used for treatment of SSTIs in one community setting. The data may be used to suggest improvements to practice in these clinics which can serve as a model for other homeless sites.

Understanding the nature of the social system is a central concept of DIT and critical to appreciating the manner in which successful implementation CA-MRSA infection control practices might be implemented within a shelter environment. Information regarding hand washing facilities, shower schedules and laundry schedules was gathered at each of the homeless shelter sites. Recognizing the current systems in place and suggesting practices attuned to those arrangements already within the established facilities reflects the DIT characteristic of compatibility.

**Recognition of CA-MRSA SSTIs**

CA-MRSA skin infections are often misidentified by the client as a spider or insect bite. A pustular lesion, boil, abscess or cellulitis which develops quickly, is painful, warm, red and appears infected with or without fever or pus should be suspect for MRSA; especially if the client is a member of a high risk group (CDC guidelines, 2008). Some clients most at risk for CA-MRSA infections are subject to health disparities, poverty, and crowded living conditions. Barnes and Sampson (2010) recount that their review of the literature revealed high-risk groups as military personnel, prisoners, the homeless, the urban poor, residents of public housing, men having sex with men and intravenous drug users.
CA-MRSA infection in soft tissue infections is endemic in many regions of the United States. Barnes and Sampson (2010) relate a 2007 infection prevalence study of four Mid Atlantic based outpatient clinics which revealed an overall MRSA infection rate 26.7% of all *Staphylococcus aureus* isolates. C. Cornell, a pediatric nurse practitioner at Seattle Children’s Hospital, reported that MRSA was isolated in approximately 29% of skin infection cultures in that hospital in 2010 (personal communication and conference lecture, Oct 27, 2011). Data supplied by Providence Associates Medical Laboratory (PAML) in *Antimicrobial Susceptibility Profile* (2010) for the Spokane, WA region indicate that 43% of *Staphylococcus aureus* cultures were positive for MRSA in that area, but the data was not subdivided to identify culture type, i.e.: wound, serum, urine or hospital acquired vs. community acquired MRSA. Certainly, MRSA infection is a significant cause of skin and soft tissue infections. Accordingly, clinicians in shelter environments should have high degree of suspicion for MRSA infection in clients who present with SSTIs.

**Pharmacological Treatments**

According to the Sanford Guide to Antimicrobial Therapy (2011-2012), current treatment guidelines for outpatient management of CA-MRSA SSTI infection for immune competent clients include incision (I&D) and drainage and wound cultures. The current, first choice pharmacologic options are (a) a sulfonamide; trimethoprim-sulfamethoxazole (Bactrim, Septra or TMP-SMX) DS (160/800) 1-2 tabs twice daily for 10 days, (b) doxycycline or less often minocycline 100 mg twice daily for 10 days and (c) clindamycin 300 mg three times a day for 10 days (Sanford Guide, 2011-2012). Frei et al. (2010) stipulate these antibiotic options “in outpatient settings because of their favorable in vitro activity, high oral bioavailability, and excellent tissue penetration” (p. 715).

To date, many *Staphylococcus aureus* soft tissue isolates have become resistant to beta-lactams (penicillins and cephalosporins) and macrolides (erythromycin, clarithromycin, azithromycin). Herch, Chambers, Maselli and Gonzales (2008) relate that prior to the recent increase in CA-MRSA infections, routine treatment of skin infections with beta lactam antibiotics such as cephalexin (a cephalosporin) was common, but such therapy may not be appropriate in light of increasing CA-MRSA infection rates. Other
authors have commented on the habit of prescribing cephalexin to treat skin infections. In their retrospective study of optimal empiric antibiotic treatment for patients with skin infections, Khawcharoenporn and Tice (2010) found that “Cephalexin preference of the clinic physicians may be due to lack of definite guidelines for empiric therapy and limited knowledge about the prevalence of community-associated MRSA” (p. 949).

To further complicate prescribing efficacy, So and Farrington (2008) report that MRSA resistance to clindamycin ranges from 8 to 10% in Texas to 94% in Illinois. C. Cornell reported a 33% clindamycin resistance rate in Seattle area MRSA isolates (personal communication and conference lecture, Oct 27, 2011). Data supplied by Providence Associates Medical Laboratory (PAML) in Antimicrobial Susceptibility Profile (2010) for the Spokane, WA region indicate a 22% clindamycin resistance rate in MRSA isolates in that community.

Frei et al. (2010) conducted a retrospective study of 149 patient charts which was designed to compare differences in treatment failures between ambulatory outpatients with SSTIs and known MRSA isolates who received TMP-SMX or clindamycin as a first line antibiotic therapy. The authors defined treatment failure as an additional positive MRSA site 5 to 90 days after treatment, a new course of antibiotic or additional I&D procedure. No significant differences in outcomes were noted between the cohorts who received TMP-SMX or clindamycin. Antimicrobial susceptibilities for CA-MRSA were 94% for clindamycin and 100% for TMP-SMX for the study population. This study reinforces the need for HC providers to be familiar with the CA-MRSA resistance patterns in their locale in order to provide effective patient treatment.

The D-zone test is necessary if clindamycin resistance is a concern. The D–zone test detects inducible clindamycin resistance in erythromycin-resistant MRSA isolates and is readily available along with culture and sensitivity testing. (Liu et al., 2011) Recognition of resistance patterns in the provider’s locale is especially important when practicing in a shelter environment where drug choice is limited and may vary between sites in the same organization and where culture and sensitivity testing may not be available.
Shelters with a clinic often have access to inexpensive generic antibiotics such as TMP-SMX, doxycycline and clindamycin. The Union Gospel Mission in Spokane, WA, a shelter for homeless men, has TMP-SMX and doxycycline on the shelves. Helping Hands Clinic, the woman’s shelter clinic at Anna Ogden Hall (AOH), also has clindamycin in stock. Different clinics have access to different formularies but most lack financial access to culture and sensitivity testing.

Side effect profiles of these three antimicrobials are important considerations for providers in a shelter environment. The IDSA guidelines developed by Liu et al. (2011) describe diarrhea as the most common side effect of clindamycin, occurring in 20% of patients and note that “Clostridium difficile-associated disease may occur more frequently, compared with other oral agents” (p.29). The reality of caring for clients with diarrhea and subsequent dehydration in a shelter environment may make clindamycin a less practical option. Doxycycline is a pregnancy category D medication and is not approved for children less than eight years because of the potential for decreased bone growth. Therefore, the pregnancy status of a female client must be assessed before using doxycycline to treat an SSTI. TMP-SMX is eliminated by the kidneys and should be used cautiously in elderly shelter clients with suspected or documented renal insufficiency.

Recently, some clinical practitioners have explored the clinical benefits of using an SSTI treatment algorithm which stipulates empiric antibiotic treatment for CA-MRSA. Chuck, Frazee, Lambert and McCabe (2010) published a retrospective chart review which evaluated the effectiveness of an empiric treatment algorithm directed at CA-MRSA for patients with SSTIs. The authors, practitioners at Alameda County Medical Center in Oakland CA, noted that “our institution adopted a SSTI treatment algorithm that promoted use of antibiotics active in vitro against CA-MRSA as well as incision and drainage” (pg. 567). They noted that often patients with simple SSTIs can improve with I&D alone, however, “many suppurative SSTIs are complicated by surrounding cellulitis and by patient co-morbidities that might hinder response to incision and drainage alone” (pg. 567). Co morbidities that reduced the effectiveness of I&D alone, included diabetes mellitus, cancer, hepatitis C, human immunodeficiency virus (HIV) and alcoholism; conditions frequently found in homeless populations.
Patients in the Oakland population with a SSTI and a co-morbidity and/or cellulitis were treated for CA-MRSA and Group A Streptococcus (GAS) as well. Thus, these patients often received a two antibiotic regimen (cephalexin and TMP/SMX) or clindamycin alone. The authors concluded that using a treatment algorithm which promotes the empiric use of antibiotics active against CA-MRSA for patients with SSTIs improved outcomes, but their conclusions did not discuss their choice for adding coverage for GAS.

Khawcharoenporn and Tice (2010) also studied empiric antibiotic therapy for patients with SSTIs in a 3-year retrospective study of patients in Hawaii. In those patients who failed initial treatment, adjusting the antibiotic to an active drug as defined by culture and sensitivity results such as TMP/SMX or clindamycin resulted in a 100% success rate and exemplifies the importance of using culture results to guide treatment whenever possible. Khawcharoenporn and Tice (2010) also noted that some experts recommended using cephalexin and TMP/SMX together as empiric treatment to cover all possible bacteria for patients with SSTIs, but “we disagree with this concept because of the increase in adverse drug reactions and likely resistance to antibiotics” (pg. 949). In the IDSA guidelines Liu et al. (2011) also note that “empirical therapy for infections due to Beta-hemolytic streptococci is likely to be unnecessary” (pg. 19) but, that outpatients with purulent cellulitis should be covered for CA-MRSA. They also note that the optimal antibiotic for treatment of non purulent cellulitis remains a “research gap” (p. 44) in information. Khawcharoenporn and Tice (2010) report that using TMP/SMX rather than cephalexin for empiric antibiotic therapy in patients with cellulitis and SSTIs results in higher success rates and less treatment failure when culture results were not available.

Plainly, consensus regarding the need to cover both CA-MRSA and GAS in SSTIs is not established. Continued research and more evidence based guidance are necessary for universal treatment guidelines for the treatment of CA-MRSA. Regardless, evidence from the literature supports empiric coverage of CA-MRSA in outpatients with SSTIs with TMP-SMX, doxycycline and clindamycin. Treating a shelter client with empiric antibiotics that cover CA-MRSA may be appropriate in light of the itinerant nature of this population and concurrent co morbidities noted earlier. However, given that local antibiotic resistance patterns will always be an important consideration to guide antibiotic therapy, the
choice of pharmacologic treatment must be made within the confines of local resistance patterns, infection patterns, side effect profiles and medications available.

**Wound Management**

Derksen (2003) states that treatment of choice of soft tissue infections (SSTI) that have formed a furuncle or carbuncle is incision and drainage (I&D). According to Derksen, a small amount of 1% or 2% lidocaine, buffered with 7.5% bicarbonate in a 25 or 30 gauge needle and a No. 11 blade, is all that is required “since only the skin over the abscess is anesthetized” (p. 145). Rod and Hoyt (2007) indicate that I&D is a treatment requirement in order to ensure that an abscess is effectively drained of pus to allow penetration of antibiotics and ensure proper healing. They cite other clinical studies which indicated that inadequate drainage of SSTIs is a major cause of treatment failure. Frei et al. (2010) and Khawcharoenporn and Tice (2010) concluded that their studies reinforced the belief that I&D is critical for the optimal management of SSTI’s. Lastly, Barnes and Sampson (2010) state that “recent primary care recommendations emphasize I&D and culturing drainage as a standard of practice in outpatient clinics, emergency departments and primary care offices” (p. 26).

I&D in a shelter environment is possible but may depend upon the surgical supplies in the shelter clinic and the expertise and training of the clinic provider. It may be necessary to refer shelter clients with SSTIs to outpatient clinics or emergency departments for I&D.

There are no standards for the need to culture SSTIs. Derksen (2003) states that cultures, if warranted, are obtained by swab of the cavity. Barnes and Sampson (2010) emphasize the importance of culturing and classifying the pathogen in wound drainage itself prior to initiating I&D. Rod and Hoyt (2007) make the case that “obtaining cultures is now of great importance to monitor the extent of CA-MRSA infection in the community” (p. 119). The recent IDSA practice guidelines of Liu et al (2011) recommend cultures when the patient has a severe infection, or systemic illness, has not responded to initial treatments or when there is concern of an outbreak. Understanding the practices and preferences of the local laboratory and local health department will help guide practice concerning culturing a SSTI.
Culturing a SSTI infection in a shelter clinic may not be financially feasible as many shelter clinics are grant funded and scarce monies are directed at client treatment, not laboratory testing.

Derksen (2003) also cautions the provider not to I&D facial furuncles in the triangle formed by the bridge of the nose and corners of the mouth due to the risk of “septic phlebitis with intracranial extension” (p. 145), but rather to treat with hot compresses and antibiotics. Hot packs twice a day are also included in standard outpatient treatment recommendations for febrile and afebrile patients with abscesses by Barnes and Sampson (2010). These authors further specify that all MRSA wounds should be covered with a dry dressing and that a twice daily application of an antibiotic ointment such as mupirocin (Bactroban) is indicated. Liu et al (2011) specify the necessity of keeping MRSA draining wounds covered with clean, dry bandages but they do not address the use of mupirocin as a topical agent nor the use of hot packs to aid in wound healing.

From the research, it is clear that wound management of CA-MRSA lesions should include I&D of suspect lesions, cultures when possible, and covering lesions with clean dry bandages. The use of a topical antibiotic such as mupirocin and hot packs as evidence based treatments is less clear.

Environmental Controls

The Centers for Disease Control (CDC) initiated the National MRSA Education Initiative in 2008. The goal of the initiative is to help the public and HC providers recognize and prevent MRSA skin infections. Earlier CDC guidelines (2006) were primarily relevant to hospital transmission of MRSA. The education pamphlets stress personal protection through hand hygiene, avoiding contact with other persons’ wounds, and not sharing personal items such as razors, towels and clothing. Recommendations for persons with a known MRSA infection are also included.

The recently published IDSA Clinical Practice Guidelines for MRSA (February 1, 2011) addresses environmental management of recurrent MRSA SSTIs. The recommendations that were established upon high research based evidence (level A-III) criteria include:

- Cover draining wounds with a clean, dry bandage,
• Maintain personal hygiene with regular bathing and regular hand hygiene with soap and water or alcohol gel, particularly after touching affected skin,

• Avoid sharing personal items such as razors and towels,

• Evaluate contacts for evidence of *S. aureus* infection.

Other environmental hygiene recommendations with less research based evidence (level C-III) include:

• Cleaning high touch surfaces such as counters, door knobs, toilet seats,

• Nasal decolonization with mupirocin twice daily for 5-10 days,

• Topical body decolonization with chlorhexadine for 5-14 days or dilute bleach baths twice weekly for approximately 3 months (Liu et al., 2011, p. 19).

The Spokane Regional Health District in Spokane, WA created a six page public information pamphlet entitled “Living with MRSA” in February 2009. This pamphlet details wound hygiene, wound care, how to clean a home for MRSA and how to manage laundry. Recommended steps for changing a bandage on a MRSA wound using multiple pairs of disposable gloves is detailed along with the recommendation to separate clothing of a MRSA patient and wash in bleach and hot water. Home cleaning and disinfection techniques with bleach, human contact avoidance in public locations such as gyms, hand washing, not sharing personal items and wound coverage with clean, dry bandages is promoted as preventing the spread of CA-MRSA infection in the home.

While some shelters allow separation of laundry, many have large industrial machines that wash scores of laundry at one time. Additionally, shelters are close environments, sometimes up to 100 beds in one large room, so avoiding contact is problematic and cleaning regimens are outside a client’s control. In addition, disposable gloves aren’t available in most shelters. The advice which details hand washing, not sharing personal objects and keeping wounds covered with clean, dry bandages is good health education for shelter clients. While all these resources have good information, they are lengthy, geared at a high reading level and are directed towards people who live in houses.
Results and Discussion

Data gathered over a four month period, January 2012 through April 2012, from two clinics which serve homeless clients; Union Gospel Mission (UGM) Clinic for men and Helping Hands Clinic for women (a branch of UGM) in Spokane, WA indicated that most practitioners are using antibiotics active against CA-MRSA to treat SSTIs (Table 1). Eight patients with SSTI’s were seen at clinic. Three of those patients were seen again for follow up and two of those repeat patients had initial treatment failure and received a second course of antibiotics. TMP/SMX was prescribed most often; 8 of 10 prescriptions. All dosages were DS and time ranged from 7-14 days. One patient received Keflex for a skin abscess in the facial triangle and one patient amoxicillin - both inactive against CA-MRSA according to PAML’s Antimicrobial Susceptibility Profile (2010). However, both of those patients had purulent, but non carbuncle forming skin infections and that may have influenced the provider’s prescribing decision. The data collected suggests that most shelter HC providers are prescribing anti-infectives active against CA-MRSA, but that dosages, the use of topical antibiotic treatment, consistent use of I & D and the use of bacterial culture is not homogeneous. The data is arranged in Table 1 and is a single representation of what one student nurse practitioner student observed while completing a practice internship at two Spokane, WA area shelter clinics during a four month period; January – April 2012. The data is not an all inclusive representation of all the clinic visits of that time period. Outcomes of treatment were noted when possible as well as culture results when available, but due to the mobile nature of this patient population, follow up was not always feasible.

Using DIT as a theoretical framework to develop practice principles, it is important to recognize the unique social system that exists in a shelter environment. Shelters are a close physical environment with many people. There are many rules regarding schedules for meals, showers, laundry, bedding, clothing and medications. Many shelters have rules that specify that clients’ possessions and medications are kept in a controlled area and clients only have access to medications, bandages and clothing at preset times. Rules are generally enforced by shelter staff and many staff are former shelter clients who have advanced to a management position within the shelter hierarchy. As such, some clients and managers
suffer situational poverty but many experience generational poverty and may have low levels of education and literacy. Nurse practitioners in shelter clinics must consider literacy levels and the unique social environment in their shelter when providing education to clients and staff.

Environmental measures to control CA-MRSA can be examined using DIT as a theoretical framework as well. Many shelters require daily showers at bedtime for infection control purposes. The men’s shelters at House of Charity (H of C) and UGM in Spokane WA require such daily hygiene measures. The woman’s shelter at Hope House also requires showers at bedtime. Shelters that have separate rooms for clients such as AOH and Woman’s Crisis Shelter do not have this requirement. Many drop in clients who sleep in the shelters are required to maintain a daily shower, while full time residents are not. Indeed, for many drop in clients a daily shower requirement is threatening, stressful and a reason for remaining on the streets. Sinks in the dining hall for hand hygiene are not universally available, nor is their use required. UGM has no sinks, but a large bottle of alcohol cleaner on the day desk. AOH has sinks but no requirements for use. Laundry facilities at many shelters utilize large capacity machines that wash multiple people’s laundry simultaneously. Therefore separation of laundry for people with MRSA infection may be impractical and not permissible.

The realities of shelter life necessitate recognition that not all environmental control measures as recommended by the CDC, Spokane Health Department and IDSA will be feasible. Indeed, it may be most efficacious to implement those CA-MRSA control measures with the most evidence, specifically: (a) covering wounds with bandages and clothing, (b) not sharing personal items, and (c) hand hygiene. Other recommendations such as maintaining clinic appointments and taking the full course of prescribed medicines as recommended by the CDC (2008) are feasible recommendations as well. Clients in a shelter clinic who present with a SSTI should be given bandage supplies, education regarding daily cleaning of affected skin and education regarding complications along with appropriate antibiotics.

Perhaps the most important educational intervention should be to present the facts regarding treatability of CA-MRSA skin infections. Past media hysteria has produced a great fear of MRSA among the public. Shelter managers are not immune to this hysteria. HC providers who work in shelters can
make a great contribution towards educating homeless clients and managers with the knowledge that although CA-MRSA is common, it is treatable with antibiotics and a manageable condition that should not cause quarantine or dismissal of an affected client.

**Summary**

**Significance to Nurse Practitioner Practice**

Nurse practitioners who work with shelter populations should have high degree of suspicion for CA-MRSA infection in clients who present with SSTIs. NPs should consider empiric treatment of shelter clients with antibiotics that cover CA-MRSA such as TMP-SMX, doxycycline and clindamycin in light of the itinerant nature of this population and concurrent co morbidities. Also, given that local antibiotic resistance patterns will always be an important consideration to guide antibiotic therapy, the choice of pharmacologic treatment must be made within the confines of local resistance patterns, infection patterns, side effect profiles and medications available. Whenever possible, I&D should be performed at the clinic to allow better wound healing and antibiotic penetration.

NPs can educate shelter clients with SSTIs to adopt efficacious infection control and wound care techniques as well. Clients should be counseled to wash lesions frequently, avoid sharing personal care items, keep lesions covered with dry clean bandages and clean clothing, avoid letting others contact wounds, and wash hands frequently – especially after touching a suspect skin lesion. Clients should also be advised to take all medications as prescribed, keep their environment as clean as possible and return for follow up if infectious symptoms become worse. Whenever possible, clients should be given oral antibiotics and bandage supplies when they present to the clinic to ensure best chance for effective treatment. A sample educational flyer that emphasizes the essential evidence-based interventions for CA-MRSA and is written mindful to the social limitations within a shelter and at an appropriate reading comprehension level, is attached in Appendix 1.

Communication with shelter staff, recognition of social norms of a shelter and validation of financial, emotional and worker constraints of the shelter environment are vital for successful CA-MRSA treatment options for shelter clients. Nurse practitioners who desire to implement evidence based practice
protocols to treat CA-MRSA must keep these concepts in mind when working in a shelter environment.

Educational materials for shelter clients should be simple; preferably a single page; state practical and realistic options for infection control, and use simple, non medical terminology to increase understanding and decrease stigmatization. NPs can stress to homeless clients and shelter managers that CA-MRSA is common, treatable with antibiotics and a manageable condition that should not cause quarantine or discharge of an affected client.

**Recommendations for Future Research**

Currently there are no published research articles or resources which explore the most efficacious pharmacologic treatments, rates of infection and means of infection control for prevention of CA-MRSA infections in a shelter based environment. Clarification regarding the need for empiric treatment of both GAS and CA-MRSA skin infections and the requirement of culture for homeless clients is also a research gap. Local infection profile data which details the type of sample collected and susceptibility profiles for *Staph aureus* are important as well as prescribing recommendations which address the point at which alternative therapies should be considered in light of a local susceptibility profile. The need for such research is obvious given the vulnerability a homeless person may experience if asked to leave a shelter due to a CA-MRSA SSTI and the risk for increased MRSA infection transmission in these environments.

Concrete treatment and environmental recommendations directed specifically at these shelter populations may help to decrease stigmatization, increase health knowledge, empower clients and ultimately improve infection rates.
References


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doi:10.1016/jemermed.2007.11.037


doi:10.3122/jabfm.2010.06.090270


Spokane Regional Health District. (2009). Living with MRSA. (Available from Spokane Regional Health District, 1101 West College Avenue, Spokane, WA 99201-2095 (509) 324-1442).

Table 1
Treatment Observations for Skin Infections in Two Homeless Clinics in Spokane WA, Jan. – April 2012.

<table>
<thead>
<tr>
<th>Date</th>
<th>Drug allergy</th>
<th>Ratio SSTI/ total pts</th>
<th>Pharmacologic Treatment</th>
<th>Infection Classification and Wound care, Culture</th>
<th>New or Follow Up Pt</th>
<th>Union Gospel Mission Or Anna Ogden Hall Clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4</td>
<td>NKDA</td>
<td>1/21</td>
<td>Bactrim DS (160/800) BID X 7 Days</td>
<td>Boil Incision and Drainage, Bandage</td>
<td>New Pt</td>
<td>UGM</td>
</tr>
<tr>
<td>1/10</td>
<td>NKDA</td>
<td>1/6</td>
<td>Bactrim DS (160/800) BID X 14 Days</td>
<td>Boil No I&amp;D, Bandage</td>
<td>New Pt</td>
<td>AOH</td>
</tr>
<tr>
<td>1/30</td>
<td>NKDA</td>
<td>1/6</td>
<td>Bactrim DS (160/800) BID X 14 Days</td>
<td>Boil, I&amp;D, Irrigation, bandage, culture (+ MRSA)</td>
<td>New Pt</td>
<td>AOH</td>
</tr>
<tr>
<td>2/1</td>
<td>NKDA</td>
<td>1/10</td>
<td>Bactrim DS (160/800) BID X 10 Days Mucipurin Ointment</td>
<td>Boil (Initial Tx Failure) (recurrent infection from 1/4/12)</td>
<td>FU Pt of 1/4 (Initial Tx Failure)</td>
<td>UGM</td>
</tr>
<tr>
<td>2/15</td>
<td>NKDA</td>
<td>1/12</td>
<td>Cephalexin 500mg QID X 10 days</td>
<td>10cmX5cm draining wound Irrigation and bandage</td>
<td>New Pt</td>
<td>UGM</td>
</tr>
<tr>
<td>2/28</td>
<td>NKDA</td>
<td>1/7</td>
<td>Bactrim DS (160/800) BID X 10 Days Mucipurin Ointment</td>
<td>Boil Incision and Drainage, Bandage Culture sent</td>
<td>New Pt</td>
<td>AOH</td>
</tr>
<tr>
<td>3/6</td>
<td>NKDA</td>
<td>1/5</td>
<td>Bactrim DS (160/800) BID X 10 Days (2nd) Mucipurin Ointment</td>
<td>Boil – not resolving Bandage (recurrent infection from 2/28/12 (+) MRSA)</td>
<td>FU Pt of 2/28 (Initial Tx Failure)</td>
<td>AOH</td>
</tr>
<tr>
<td>3/7</td>
<td>NKDA</td>
<td>1/23</td>
<td>Amoxicillin 500 mg BID X 7 days Referral</td>
<td>Facial Triangle Abscess - Referral to ED for Incision/ Drainage</td>
<td>New Pt</td>
<td>UGM</td>
</tr>
<tr>
<td>4/10</td>
<td>NKDA</td>
<td>1/5</td>
<td>Bactrim DS (160/800) BID X 10 Days Mucipurin Ointment</td>
<td>Boil Incision and Drainage, Bandage Culture sent</td>
<td>New Pt</td>
<td>AOH</td>
</tr>
<tr>
<td>4/17</td>
<td>NKDA</td>
<td>1/6</td>
<td>Bactrim DS (160/800) BID X 10 Days (same Rx) Mucipurin Ointment</td>
<td>Resolving Boil Incision and Drainage, Bandage Culture results (+) MRSA</td>
<td>FU Pt of 4/10 Infection clearing</td>
<td>AOH</td>
</tr>
<tr>
<td>4/18</td>
<td>NKDA</td>
<td>1/30</td>
<td>Bactrim DS (160/800) BID X 10 Days Mucipurin Ointment</td>
<td>Boils (2) No I&amp;D Bandage</td>
<td>New Pt</td>
<td>UGM</td>
</tr>
</tbody>
</table>
Appendix 1

Prevention of Skin Infections in our Shelter Home

Protect Yourself

1. Wash your hands often or use alcohol based cleaner.
2. Shower daily and wash any cuts, boils or skin scrapes with soap.
3. Don’t share razors, soap, washcloths or towels with others.

Protect Others – If you have a skin infection

1. Always cover any sores with a clean bandage and clean clothing.
2. Wash the sore daily – don’t share your soap or towel.
3. Take all medicine that was given to you correctly for the full length of time even if the sore is healing and you feel better.
4. Dispose of all bandages and tape in the trash and wash your hands after changing a bandage.
5. If you are able to place a hot washcloth on the sore, put the washcloth in the laundry so no one else will use it by mistake.
6. Return to the clinic if you have a fever, the infection does not improve or you have questions.

Many skin infections are caused by MRSA (methicillin resistant Staphlococcus aureus) and MRSA is common BUT,

WE HAVE GOOD TREATMENTS.