DISTRICT HEALTH DEPARTMENT

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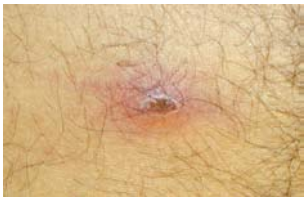
Community-Associated MRSA Infection Surveillance in Washoe County
Final Report For Health Care Providers

1. BACKGROUND



Methicillin-resistant *Staphylococcus aureus* (MRSA) are resistant to β-lactam antibiotics, including penicillinase-resistant penicillins (methicillin, oxacillin, nafcillin) and cephalosporins. MRSA are recognized pathogens among hospitalized patients and persons with certain healthcare-associated risk factors. Recent reports suggest the frequency of MRSA infections among otherwise healthy persons without typical healthcare-associated MRSA (HA-MRSA) risk factors is increasing. The full clinical spectrum, epidemiology, and risk factors for community-associated MRSA (CA-MRSA) have yet to be defined. Current evidence suggests these strains are genetically distinct from HA-MRSA, cause a different spectrum of illness including skin and soft tissue infections (SSTI) that may be severe, and have different antibiotic susceptibility patterns than HA-MRSA. Severe invasive disease (e.g., bacteremia/sepsis syndrome, pneumonia, pyomyositis, bone and joint infections) due to CA-MRSA has been reported less frequently than SSTI [1]. The community antibiogram indicates the MRSA rate in Washoe County increased significantly from 31% in 2001 to 44% in 2003 among *S. aureus* isolates identified from all laboratories in Washoe County.

2. UNDERSTANDING THE TERMINOLOGY

Various terms such as community-acquired, community-onset, and community-associated MRSA infections have been used since the 1960s. The use of these terms has been inconsistent in the published literature. Community-associated MRSA (CA-MRSA) is now the preferred terminology used by public health professionals and the CDC. Until the late 1990s, the terms nosocomial infection (i.e., infection acquired in hospital) and community-acquired infection were used. The implicit assumption was where infection occurred was where the patient acquired the organism. This assumption was not appropriate. Emerging public health interest in MRSA required being able to distinguish the source of the organism (community vs. hospital) rather than where the patient was when the infection developed. New terms were developed to better describe where the infection occurred and where the organism was likely acquired. These terms are hospital-onset (HO) MRSA and community-onset (CO) MRSA. HO-MRSA is the same as "nosocomial infection". It refers to infection that first develops >2 days following admission to a hospital or long-term care facility. CO-MRSA refers to outpatient infection or to infection within 2 days of admission to a hospital. CO-MRSA is further sub-categorized to healthcare-associated (HA) or community-associated (CA) to identify the source of the organism. HA identifies the source as likely from a healthcare setting (e.g., history of hospitalization, surgery, dialysis in the past year or having a permanent indwelling catheter or percutaneous device). CA identifies the source as either likely from the community (if without medical risk factors) or unclear (if with medical risk factors) [2]. In the following report, CA-MRSA, is defined as community-associated MRSA.

3. SURVEILLANCE METHODS AND RESULTS

The Washoe County District Health Department (WCDHD) conducted surveillance for CA-MRSA between March 1, 2003 and December 31, 2004. The objectives of this surveillance were:

- to estimate the magnitude of CA-MRSA in Washoe County;
- to understand the disease;
- to facilitate planning in education and intervention strategies;
- to evaluate education;
- to detect outbreaks and/or clusters.

3.1 Case Definition of CA-MRSA [3]

- Diagnosis of MRSA was made in the outpatient setting or by a culture positive for MRSA within 48 hours after admission to the hospital; **AND**
- The case has had no previous positive MRSA culture; **AND**
- The case has no history in the past 12 months of hospitalization, dialysis, or surgery; **AND**
- The case has no percutaneous device or indwelling catheter.

3.2 Methods and Investigation Algorithms

Passive surveillance with an active component was used. CA-MRSA is not a reportable disease in Nevada. Reporting presumptive CA-MRSA was voluntary. After receiving a report, the WCDHD public health nurses conducted phone interviews with Washoe County patients. An investigation form which was slightly revised from the Minnesota Department of Health was used. If patients

could be reached, their case status was classified as CA-MRSA or HA-MRSA based on the interview results. If patients couldn't be reached for various reasons, the case was classified based on information provided by the chart. If the chart was unable to provide enough information to classify a case or no chart was available, the case was classified as "unable to determine". Due to the complexity of the case definition, only cases classified as CA-MRSA were included in the data analysis.

3.3 Incidence Rate

A total of 295 cases were reported between March 1, 2003 and December 31, 2004. A total of 235 cases were reported in 2004. Of the 235 reports in 2004, 152 (65%) met the case definition, which is an incidence rate of 39.2 per 100,000 population. Out of all the notifiable diseases/conditions reported in 2004 in Washoe County, CA-MRSA was the fifth most frequently reported disease behind chlamydia, chronic hepatitis C, RSV and gonorrhea.

3.4 Demographic Distribution

Of the 152 CA-MRSA cases in 2004:

- the median age was 39 years (range: 1-77 years);
- 60% were in the 18-44 age group and 9.8% were under 18 years of age;
- 64% were male;
- 75% were White, non-Hispanic.

3.5 Clinical Presentation and Outcome

Of the 152 CA-MRSA cases, 140 (92%) had skin infections (e.g., abscess or boil, cellulitis) and 6 (4%) had bacteremia. This finding was consistent with reports in the literature.[4] Thirty percent of cases reported hospitalization due to CA-MRSA infection. No deaths were reported at the time of interview.

3.6 Underlying Causes, Risk Factors or Associated Illness

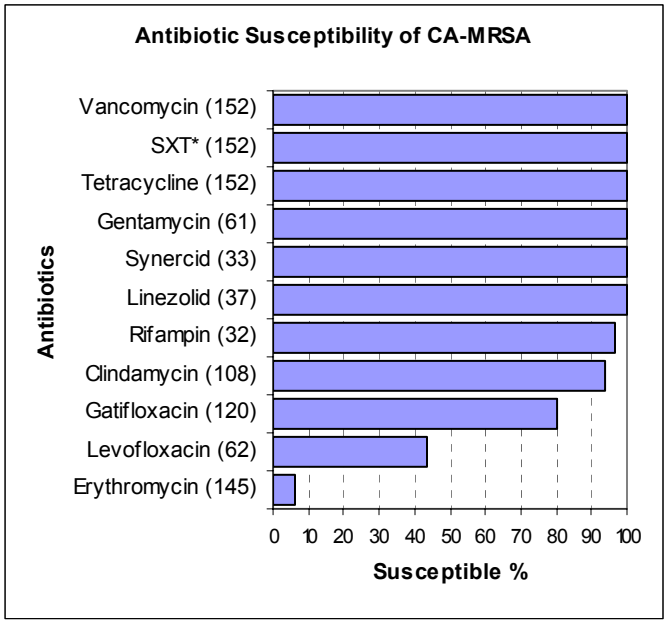
Of the 113 cases that had a complete history of underlying diseases/conditions:

- 49% were tobacco users;
- 19% were injecting drug users;
- 13% had chronic liver diseases;
- 11% reported alcohol abuse;
- 9% had pre-existing wound/burn at MRSA site;
- 9% had asthma;
- 9% were exposed to someone with a similar infection;
- 5% had chronic dermatological conditions;
- 4% had HIV/AIDS

Overall, 78% (88/113) of cases reported having one or more of the above conditions or diseases.

3.7 Antibiotic Susceptibility

The following chart illustrates the antibiotic susceptibility of CA-MRSA to each antibiotic tested. All isolates were resistant to cefazolin, a first generation cephalosporin (e.g., Keflex, Ancef).



** SXT: Trimethoprim-sulfamethoxazole*

3.8 Antibiotics Prescribed

Antibiotics were prescribed for 147 of 152 cases (97%) on the initial visit. Of 140 cases who reported antibiotic names, 94 (67%) received β-lactam antibiotics (Keflex, Ancef, Unasyn, Augmentin, Rocephin, Cefuroxime, Dicloxacillin, Cephelexin, etc.) with or without incision & drainage (I&D), 34 (24%) received non β-lactam antibiotics (Bactrim, Septra, Clindamycin, Levaquin, Biaxin, Rifampin, etc.), and 12 (9%) received a combination of β-lactam and non β-lactam antibiotics.

3.9 Clusters of MRSA Skin Infection

Two clusters of 18 MRSA skin infection cases were identified in March and April 2004 through the CA-MRSA surveillance system. These cases were residents of a local weekly motel or inmates of the county jail. The final sources of infection for the two clusters were not identified. Anecdotal information indicated the cases shared needles, knew other people who had boils, and they helped each other lance them. Education and control measures were implemented by the WCDHD and associated facilities.

4. EDUCATION AND ITS EVALUATION

4.1 Public Education

The WCDHD developed education materials (brochures and posters) in English and Spanish for the public. The key messages in the education materials were:

- What is MRSA?
- What problems can MRSA cause?
- Who is at higher risk for MRSA infection?
- How to prevent the spread of MRSA to others?

The information can be downloaded from the following website:
http://www.co.washoe.nv.us/health/cdpp/mrsa/mrsa.html

Health care providers in Washoe County can order the printed materials free of charge at this website or by calling 775-328-2447. These materials have been distributed to high-risk populations including injecting drug users, gay men, inmates and football players, as well as facilities such as weekly motels, jails, drug treatment centers, RV parks, and gyms in Washoe County. An educational campaign was conducted in April 2004.

Anecdotal feedback from some health care providers indicated that more patients with MRSA skin infections sought medical care after the education campaign.

4.2 Provider Education

The WCDHD published five issues of the Epi News/ Physician Alert in 2003-2004. These issues contained an MRSA fact sheet, reporting algorithm, surveillance results, and MRSA skin infection clusters identified in the community. All issues of Epi News are available at the following website:
http://www.co.washoe.nv.us/health/cdpp/epinews.html

Increased awareness of CA-MRSA among Washoe County providers was observed in 2004 compared to 2003. Evidence of this is illustrated by:

- Improved Reporting
  Between July 1, 2003 and December 31, 2003, 31 CA-MRSA cases were reported from three institutions. In contrast, during the same time period in 2004, 85 CA-MRSA cases were reported from eight institutions/medical groups.
- β-Lactam Antibiotic Prescriptions Reduced
  Between August 15, 2003 and April 12, 2004, four issues of the Epi News/Physician Alert notified health care providers of surveillance results and identified MRSA clusters. In these issues, recommendations for appropriate antibiotic use were repeatedly emphasized. β-Lactam antibiotics are not appropriate for MRSA infections. An assessment of the proportion of MRSA cases who receive β-Lactam antibiotics can evaluate physicians' prescribing practices. The proportion of cases who received β-Lactam antibiotics on their initial visit decreased from 75% before August 15, 2003 to 63% after April 12, 2004. However, this reduction was not statistically significant.
- Some health care providers documented their awareness of increasing CA-MRSA in Washoe County in the patient's chart.

5. INTERIM GUIDELINES FOR TREATMENT & PREVENTION

5.1 Treatment

The definitive guidelines for management of *S. aureus* SSTI in outpatients where there are increasing levels of CA-MRSA are not available from the CDC or other medical professional organizations. For clinicians' reference, the WCDHD would like to recommend an interim guideline recently developed by multiple agencies.[1] The complete document can be downloaded at: http://www.co.washoe.nv.us/health/cdpp/mrsa/mrsa.html. The highlights of this document are in Figure 1 on page 5 and Table 1 and 2 on page 6.

5.2 Prevention

Skin infections with MRSA are thought to be transmitted by close skin-to-skin contact with another person infected with MRSA or by contact with a fomite or surface contaminated with MRSA. Health care personnel should use Standard Precautions and Contact Precautions to help prevent the spread of MRSA in the health care setting. For more detailed information on infection control measures in health care settings, please check CDC's website at: http://www.cdc.gov/ncidod/hip/aresist/mrsahcw.htm. Guidelines for non-healthcare settings [5] such as gyms, steam rooms and saunas and laundry, please visit the following website:
http://www.co.washoe.nv.us/health/cdpp/mrsa/mrsa.html.

6. CONCLUSIONS

Nearly two-years of surveillance data in Washoe County gives us a better understanding of CA-MRSA in our community. The key messages we would like healthcare providers to remember are:

- Think MRSA when patients present with skin and soft tissue infection. It *is* in the community, not just in the hospital.
- **DO NOT** prescribe Keflex, Ancef, Augmentin, or other β-lactam antibiotics if MRSA is suspected. Outpatient use of quinolones (e.g., Cipro) and macrolides (e.g., erythromycin) are NOT recommended because of high resistance rates.
- CA-MRSA is genetically distinct from HA-MRSA.
- In 2004, CA-MRSA was the 5th most frequently reported communicable disease in Washoe County.
- CA-MRSA infections were seen in the younger age group (18-44 years).
- CA-MRSA caused skin and soft tissue infections but invasive disease was also observed among 4% of CA-MRSA cases.
- Public education materials and interim guidelines for management of MRSA skin and soft tissue infections in the outpatient setting can be downloaded at the District Health Department's website at: http://www.co.washoe.nv.us/health/cdpp/mrsa/mrsa.html.

7. REFERENCES

1. Tim Dellit, MD, Jeffrey Duchin, MD, Jo Hofmann, and Erika Gurmai Olson, MD. Interim Guidelines for Evaluation & Management of Community-Associated Methicillin-Resistant *Staphylococcus aureus* and Soft Tissue Infections in Outpatient Settings. September 2, 2004. http://www.metrokc.gov/health/prevcont/mrsa.htm

2. James Hadler, MD, MPH. Surveillance for MRSA: Should My State Be Doing It? – Lessons Learned from the EIP. The CSTE Annual Conference. June 9th, 2004. Boise, ID.
3. CDC Website: http://www.cdc.gov/ncidod/hip/ARESIST/ca_mrsa_clinician.htm
4. John G. Bartlett, MD. Antibiotic Selection for Infections Involving Methicillin-Resistant *Staphylococcus aureus*. May 28, 2004. www.medscape.com
5. http://lapublichealth.org/acd/MRSA.htm

IMPORTANT ANNOUNCEMENT!!!

The District Health Department ended surveillance for CA-MRSA as of January 1, 2005. Reporting of sporadic CA-MRSA cases is no longer necessary. However, if you observe unusual numbers of CA-MRSA infections among patients in your health care setting, please contact the Epi Center, Communicable Disease Program at 328-2447 to report.

8. ACKNOWLEDGEMENTS

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- Robert J. Riley, M.D.
- Sage Alliance
- Saint Mary's Regional Medical Center
- Sierra NV Family Medicine
- Village Family Practice
- Washoe County Detention Facility
- Washoe Medical Center
- Washoe Medical Center Clinic
- Washoe Medical Center at South Meadows

Figure 1. Management of Suspected *S. aureus* Skin and Soft Tissue Infection [1]

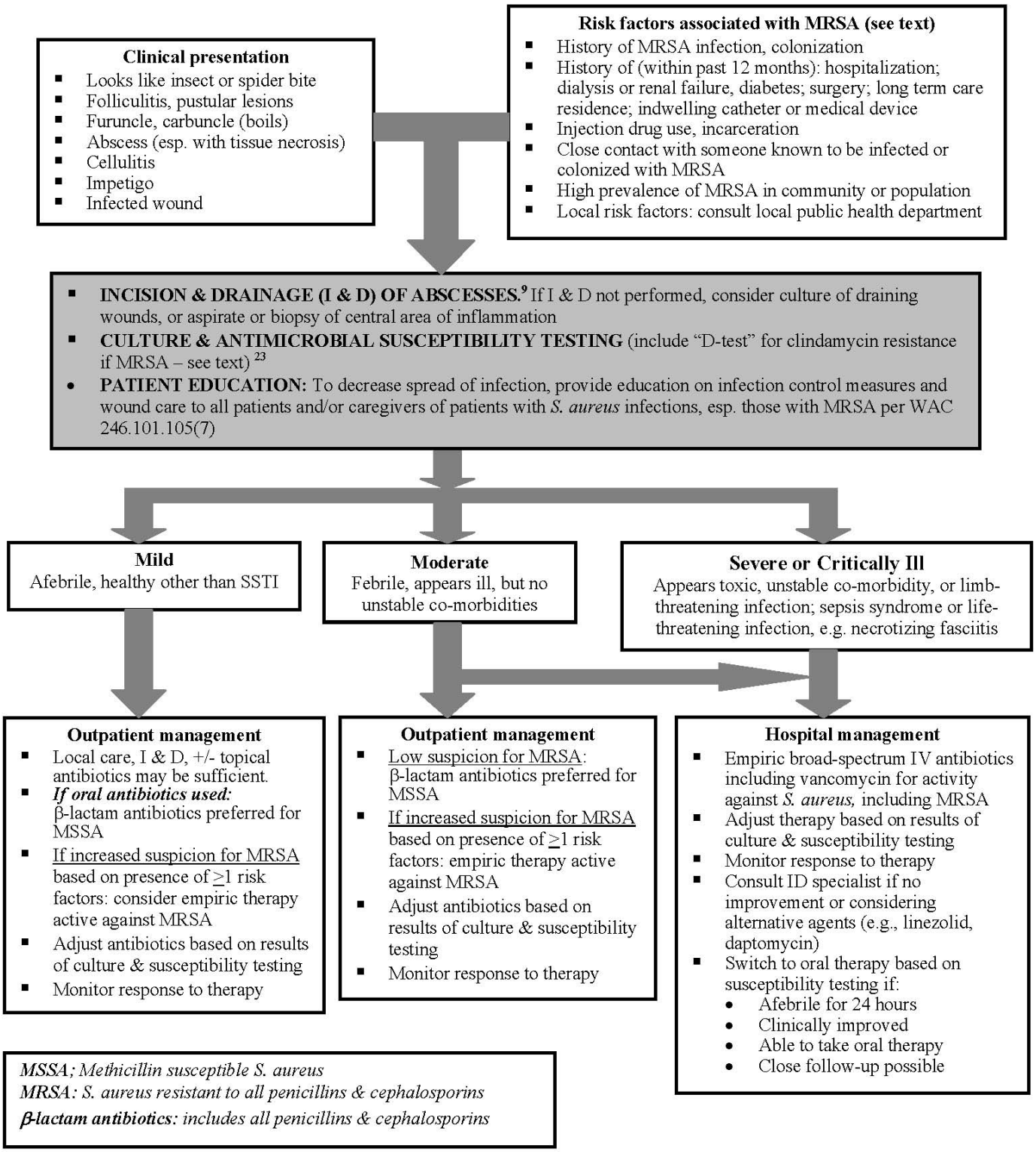

Table 1. Interim Guidelines for Empiric Oral Antimicrobial Treatment of Outpatients with Suspected MRSA Skin and Soft Tissue Infections (SSTI) [1]

Selection of empiric therapy should be guided by local *S. aureus* susceptibility and modified based on results of culture and susceptibility testing. The duration of therapy for most SSTI is 7-10 days, but may vary depending on severity of infection and clinical response. ***NOTE: Before treating, clinicians should consult complete drug prescribing information in the manufacturer's package insert or the PDR.***

Antimicrobial	Adult Dose	Pediatric Dose
Trimethoprim-sulfamethoxazole (TMPSMX) DS	1 tablet (160 mg TMP/800 mg SMX) PO bid	Base dose on TMP: 8-12 mg TMP (& 40-60 mg SMX) per kg/day in 2 doses; not to exceed adult dose
Minocycline or doxycycline	100 mg PO bid	***Not recommended for pediatric use – suggest consultation with infectious disease specialist before use***
Clindamycin	300-450 mg PO qid	10-20 mg/kg/day in 3-4 doses; not to exceed adult dose

NOTE: If Group A streptococcal infection is suspected, oral therapy should include an agent active against this organism (ß-lactam, macrolide, clindamycin). Tetracyclines and trimethoprim-sulfamethoxazole, although active against many MRSA, are not recommended treatments for suspected GAS infections.

NOTE: **Outpatient use of quinolones or macrolides.** Fluoroquinolones (e.g.,ciprofloxicin, levofloxacin, moxifloxacin, gatifloxacin) and macrolides (e.g., erythromycin, clarithromycin, azithromycin) are NOT recommended for treatment of MRSA because of high resistance rates. If fluoroquinolones are being considered, consult with infectious disease specialist before use.

NOTE: Outpatient use of Linezolid in SSTI. Linezolid is costly and has great potential for inappropriate use, inducing antimicrobial resistance, and toxicity. Although it is 100% bioavailable and effective in SSTI, it is not recommended for empiric treatment or routine use because of these concerns. It is strongly recommended that linezolid only be used after consultation with an infectious disease specialist to determine if alternative antimicrobials would be more appropriate.

If considering clindamycin, isolates resistant to erythromycin and sensitive to clindamycin should be evaluated for inducible clindamycin resistance (MLS_B phenotype) using the "D test." Consult with your reference laboratory to determine if "D testing" is routine or must be specifically requested. If inducible resistance is present, an alternative agent to clindamycin should be considered.

Table 2. Eradication of MRSA Colonization

Efficacy of decolonization in preventing re-infection or transmission in the outpatient setting is not documented, and is NOT routinely recommended. Consultation with an infectious disease specialist is recommended before eradication of colonization is initiated. **Possible regimens include:**
Rifampin (Adult dose: 300mg PO bid x 5 days; pediatric dose: 10-20 mg/kg/day in 2 doses not to exceed 600 mg/d x 5 days) may be used in combination with TMP-SMX, OR rifampin with doxycycline, OR rifampin with minocycline, for recurrent MRSA infection despite appropriate therapy.

Never use rifampin monotherapy, due to the rapid emergence of resistance. Rifampin interacts with methadone, oral hypoglycemics, hormonal contraceptives, anticoagulants, protease inhibitors, phenytoin, theophylline, cardiac glycosides and other drugs.

Topical intranasal mupirocin may be used bid for 5 days with or without systemic antimicrobial therapy.
Skin antisepsis with chlorhexidine or other agents may be used in addition to one or both of the above regimens.