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STATE PLAN for PREVENTION AND TREATMENT of  
METHICILLIN RESISTANT *STAPHYLOCOCCUS AUREUS* INFECTIONS

INTRODUCTION

*Staphylococcus aureus*, often referred to as “staph,” is a commonly occurring bacterium that is carried on the skin and in the nose of healthy persons. *S. aureus* may cause minor skin or soft tissue infections such as boils, as well as more serious infections such as wound infections, abscesses, pneumonia, and sepsis. Methicillin-resistant *Staphylococcus aureus* or “MRSA” are staph bacteria that have become resistant to  $\beta$ -lactam antibiotics, including: penicillin, ampicillin, amoxicillin, amoxicillin/clavulanate, methicillin, oxacillin, dicloxacillin, cephalosporins, carbapenems (e.g., imipenem), and the monobactams (e.g., aztreonam). MRSA causes the same types of infections as staphylococcal bacteria that are sensitive to beta-lactam antibiotics.

Initially, infection with MRSA was associated with exposure to a health-care environment, particularly the inpatient hospital setting. However, MRSA strains have evolved that affect previously healthy persons who have not been in contact with health-care facilities. These MRSA strains account for an increasing proportion of overall staphylococcal infections.

Awareness about MRSA has increased over the last five years resulting in fewer physicians empirically prescribing  $\beta$ -lactam antibiotics, and both the Infectious Disease Society of America and Centers for Disease Control and Prevention (CDC) have written guidelines that include treatment of MRSA skin and soft tissue infections [1, 2]. However, awareness of these advances is far from universal. Areas needing special

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emphasis are early screening for infection, use of conservative mechanical therapies (incision and drainage and compresses) in lieu of antibiotics, and appropriate selection of antibiotics when required. The role of environmental surfaces in infection transmission also remains poorly understood. The most controversial issue is whether control of health-care associated infections should be achieved through “search and destroy,” in which both patients with active infections and carriers are screened and treated, or through less expensive, less aggressive protocols.

The Infectious Disease Surveillance and Epidemiology (IDSE) Branch of the Texas Department of State Health Services is committed to addressing these issues and reducing mortality and morbidity from MRSA through the following objectives:

- Decrease injudicious use of antimicrobials
- Increase compliance with antisepsis
- Develop and utilize evidence-based treatment and prevention protocols
- Mobilize resources to achieve reduction in infection rates
- Employ legislative and regulatory measures as needed
- Design evaluation tools for education, control, and prevention measures

## SURVEILLANCE

Surveillance for MRSA has been widely discussed and consensus has not been reached as to its utility in a public health context. Notifiable infectious diseases that are reportable by law generally deal with organisms that are not expected to occur within the general population, so that their detection through surveillance permits the identification of populations at risk for whom prevention and control measures can be recommended and instituted. CDC estimates that 29.9% of the non-institutionalized civilian population

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in the United States carry *Staphylococcus aureus* in their noses and 0.8% carry MRSA. From a public health perspective, *S. aureus* in general and MRSA in particular are endemic throughout the entire population of the country; and virtually everyone is at risk of exposure to these agents, if not already harboring them. In this public health context, surveillance of MRSA cannot help to determine who may be at risk for infection; everyone potentially is at risk. Furthermore, making MRSA a notifiable public health condition will only identify those persons who come to medical attention and have cultures taken to detect MRSA. This group is a small but undetermined fraction of all of the persons who actually carry or are infected with MRSA. In order to determine prevalence and incidence of MRSA, the systematic study of select populations will be required.

While routine public health surveillance for MRSA as a notifiable condition is arguably of little value in reducing morbidity or mortality due to this organism, a much stronger case can be made for the surveillance for MRSA on an individual, group, or institutional/facility level. Defined risk factors in these settings may place individuals or groups at increased risk for MRSA. MRSA should be considered in the differential diagnosis of any suspected staph skin lesion or infection. In health-care facilities, underlying medical problems, surgical procedures, and the use of antibiotics may place patients at increased risk for MRSA infections. Studies have documented that routine MRSA surveillance (routine nares surveillance in all ICU patients upon ICU admission and weekly thereafter while hospitalized in the ICU) in ICUs can result in significant reductions in MRSA transmission in the ICU and general hospital environment [3]. In a landmark study involving MRSA infections in a professional football team, Kazakova

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and others identified turf abrasions and player positions as important risk factors for developing MRSA infections among 5 of 58 players [4]. In these settings, surveillance efforts are focused on defined populations at risk. They are targeted and specific.

Based on a targeted surveillance approach, IDSE has carried out sentinel surveillance projects that have assessed MRSA infections in high school athletes and county jail inmates (See Appendix I—Special Projects). Many of these data are available on the Branch website ([www.mrsaTexas.org](http://www.mrsaTexas.org)).

Future special surveillance projects that have been proposed include:

- Additional monitoring of skin infections in high risk populations such as jails and athletic departments
- Determining relative importance of personal protective equipment and isolation in hospital settings
- Cost effectiveness of MRSA prevention and control
- Number of cultures, incision and drainage procedures, and amount and type of antibiotic use in outpatient settings and physician practices
- Knowledge, skills, and abilities in health-care providers

IDSE has recently launched *EpiLink*, a web-based publication that will serve as an additional resource in disseminating MRSA data.

## INTERVENTIONS

IDSE has assumed responsibility for leading and coordinating many interventions related to MRSA prevention and control. These efforts include decreasing injudicious use of antimicrobials by providing continuing education modules for health professionals

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on this topic and on MRSA. The writing, production, and dissemination of “Prevention, Treatment, And Containment of Methicillin-Resistant *Staphylococcus aureus* Infections in County Jails” and various studies related to environmental contamination have enhanced evidence-based treatment and prevention protocols (Appendix I—Special Projects). Additional educational tools for the general public have also been designed, produced, and distributed (See Appendix II—Distribution of Materials).

IDSE has partnered with multiple organizations and agencies in MRSA control and prevention. Physicians, pharmacists, nurses, infection control practitioners, and epidemiologists provide technical advice as members of the Infectious Disease Epidemiology Workgroup. Eight correctional facility personnel representing five correctional facilities served as workgroup members for the development of “Prevention, Treatment, and Containment of Methicillin-Resistant *Staphylococcus aureus* Infections in County Jails.” A broad spectrum of organizations has invited IDSE presenters to address MRSA issues at conferences either through presentation or booths (Appendix III—Presentations and Publications). The University of Texas School of Biological Sciences and Texas State University Clinical Laboratory Science Program have provided hundreds of student and faculty man-hours in special projects. IDSE has recently formed another coalition to assist in the development of community guidelines, educational materials, and special projects for MRSA prevention. Partnering organizations include representatives from health science hospitals, laboratories, local and regional health departments, halfway houses for formerly incarcerated persons, child-care, biotech industries, and cosmetology. IDSE has also recently submitted a letter of support to the University of Texas School of Public Health for its research on a MRSA vaccine.

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Evaluation of education, control, and prevention measures remains a significant challenge. A concerted effort should be made to incorporate evaluation into the education and research generated through the community workgroup. Continuing review and revision of existing materials should also be a priority.

## REFERENCES

1. Stevens DL, Bisno AL, Chambers HF, et al. Practice guidelines for the diagnosis and management of skin and soft tissue infection. *Clin Infect Dis* 2005; 41:1373-1406.
2. Centers for Disease Control and Prevention. Management of multidrug-resistant organisms in healthcare settings, Siegel JD, Rhinehart E, Jackson M, Chiarello L, et al. 2006. <http://www.cdc.gov/ncidod/dhqp/pdf/ar/mdroGuideline2006.pdf>. Accessed May 18, 2007.
3. Huang S, et al. Impact of routine intensive care unit surveillance cultures and resultant barrier precautions on hospital-wide methicillin-resistant *Staphylococcus aureus* bacteremia. *Clin Inf Dis* 2006; 43:971-8)
4. Kazakova S, et al. A Clone of Methicillin-Resistant *Staphylococcus aureus* among Professional Football Players. *NEJM* 2005;352:468-475

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**Appendix I**  
**MRSA Special Projects at Infectious Disease Surveillance and Epidemiology Branch**  
**of the Texas Department of State Health Services**  
**2005-2007**

<b>Study Description</b>	<b>Objective</b>	<b>Date</b>
2004-05 academic year survey of UIL Region IV 4A and 5A high school athletic departments	Determined prevalence of MRSA infections in participants in athletic programs to alert athletic department staff to prevalence of MRSA in various sports. Determined feasibility of case-control study.	September 2004- June 2005
Carriage rates among new inmates in Travis County jail.	Determined prevalence of nasal carriage of staph and identify PFGE strains in correctional facilities.	July 2004- April 2005
Antibiotic susceptibility testing of active skin and soft tissue (SSTI) lesions in Travis County Jail	Developed antibiogram to facilitate appropriate empirical use of antibiotics for SSTIs in correctional facilities.	Summer 05
Characterization of Skin and Soft Tissue Infections in Travis County Jail	Collected 2004 baseline data and 2006 post-intervention data from Travis County Correctional Complex wound line to evaluate effectiveness of intervention.	May 2005-present
Test environmental surfaces on UT-Austin campus to determine their role in MRSA transmission	Determined probability of MRSA transmission via environmental surfaces in public facilities and relative importance of environmental cleaning in reducing risk of MRSA.	January 2004-May 2005
2005-06 academic year survey of UIL Region IV 4A and 5A high school athletic departments	Alerted athletic department staff to prevalence of MRSA in various sports participants and compared prevalence over time.	January 2006-May 2006
Test laundry and environmental facilities at Travis County Correctional Facility	Determined role of contaminated laundry and environmental surfaces in MRSA transmission at correctional facilities and recommend appropriate laundering and environmental cleaning practices for correctional facilities.	September 2005- December 2005
Current Practices Survey of Athletic Trainers in UIL Region IV	Using hypothesis-generating questionnaire, determined areas where intervention and/or more research is needed in order to recommend appropriate practices for risk reduction.	January 2006-May 2006
Investigation of perceived MRSA outbreak at Rockdale Alcoa plant	Surveyed workers to determine etiology of skin infections and establish rate of infection for comparison purposes.	September 2006-April 2007
Prevalence of Pathogens in High School Athletic Department Whirlpools	Tested whirlpool water and drains for enteric and staphylococcal organisms and pseudomonads at 8 local high schools.	January 2007-May 2007

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Test environmental surfaces in bathrooms on UT-Austin campus to determine their role in MRSA transmission	Determined probability of MRSA transmission via environmental surfaces in public facilities and relative importance of environmental cleaning in reducing risk of MRSA.	September 2006- November 20/07
Deaths to Staphylococcal Infections	Obtain an accurate count of the number of deaths in which staphylococcal infections are involved as reported by both underlying and contributing causes of death on death certificates of Texas residents.	January 2007- present
Assessment of Methicillin Resistant <i>Staphylococcus aureus</i> (MRSA) Educational Materials	Evaluate materials on MRSA prevention and control with regard to technical accuracy, readability, and appropriate target audience and identify target groups or subject areas for which no suitable MRSA educational material exists.	May 2007- present



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**Appendix II  
MRSA Educational Materials Available**

**Through the Infectious Disease Surveillance and Epidemiology Branch of the  
Texas Department of State Health Services**

A Good Offense is Still the Best Defense

How to Take Care of Your Skin Infection

Taking Care of Wounds that Are Draining or Have Not Healed

Wash Your Hands

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**Appendix III**  
**MRSA Presentations and Publications**  
**Infectious Disease Surveillance and Epidemiology Branch of the Texas Department**  
**of State Health Services**  
**2005-2006**

<b>Study Description</b>	<b>Presentation/Publication</b>
2004-05 academic year survey of UIL Region IV 4A and 5A high school athletic departments	South Padre Athletic Trainers Symposium (SPATS) June 2005.  Barr B, Felkner M, Diamond PM. High school athletic departments as sentinel surveillance sites for community-associated methicillin-resistant staphylococcal infections. <i>Tex Med.</i> 102:56-6, 2006.  Poster developed for International Society for Microbial Resistance summits in Houston and Los Angeles—summer 2005.
Carriage rates among new inmates in Travis County jail.	Results shared with jail health administration and included in “Prevention, Treatment, And Containment of Methicillin-Resistant <i>Staphylococcus aureus</i> Infections in County Jails” manual.  Accepted for publication in <i>Journal of Correctional Healthcare</i> . “Methicillin Resistant <i>Staphylococcus aureus</i> Nasal Carriage Rate in Texas County Jail Inmates” Tentative publication: Volume 13 Issue 3
Antibiotic susceptibility testing of active skin and soft tissue (SSTI) lesions in Travis County Jail	Antibiogram calculated and reported to jail health administration.
Characterization of Skin and Soft Tissue Infections in Travis County Jail	2004 data collection reported to jail health administration.  Data used in “Prevention, Treatment, And Containment of Methicillin-Resistant <i>Staphylococcus aureus</i> Infections in County Jails” manual.
Test environmental surfaces on UT-Austin campus to determine their role in MRSA transmission.	Student report completed May 2005 and given to UT environmental officer.  Presentation at Lab Director’s Conference April 18, 2007.

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2005-06 academic year survey of UIL Region IV 4A and 5A high school athletic departments	Presented at SPATS June 2006.  Information given to reporter for MRSA article in <i>Current Health</i> .  Presented in poster session of International Society for Microbial Resistance summits in Houston and Los Angeles, summer 2006.
Test laundry and environmental facilities at Travis County Correctional Facility	Data used in "Prevention, Treatment, And Containment of Methicillin-Resistant <i>Staphylococcus aureus</i> Infections in County Jails" manual.
Current Practices Survey of Athletic Trainers in UIL Region IV	Information given to reporter for MRSA article in <i>Current Health</i> and in SPATS presentation June 2006.
Distribution of Jail Guidelines	37th Annual Jail Management Conference, October 2006, Huntsville, Texas
Distribution of MRSA materials	2006 MRSA Educational Summit June 2006 Houston, Texas
Distribution of Jail Guidelines	Texas Jail Association Conference August 2006, South Padre Island, Texas
	National Association of Social Workers Conference, November 2005, Galveston, Texas.
Distribution of Jail Guidelines	2 <sup>nd</sup> Annual Municipal Jail Association Conference, April 2007, Plano, Texas