

10-2007

# MRSA Prevention and Control in County Correctional Facilities in the Greater Dayton Area

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MRSA Prevention and Control in  
County Correctional Facilities in the Greater Dayton Area

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An Applied Research Manuscript

Presented to

The Faculty of the Master of Public Health Program

Wright State University

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In Partial Fulfillment

of the Requirements for the Degree

Master of Public Health

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by

Jeffrey Allen Webb

October 2007

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## **Acknowledgements**

I would like to acknowledge the assistance of the following:

Dr. John Czachor M.D.  
Dr. Tom Murphy M.D.  
Dr. Ray Ten Eyck M.D.  
Dr. Sara Paton PhD  
Dr. Janet Rickabaugh PhD

Special thanks to my consultant, Dr. John Czachor M.D.

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## **Abstract**

Recently there has been an increasing number of methicillin-resistant *Staphylococcus aureus* (MRSA) cases in correctional facilities around the country, including the Greater Dayton area. Considering the potential health impact of MRSA on correctional facilities it is important that facilities have prevention and control protocols in place. This study summarizes the prevention and control preparedness activities of county correctional facilities in the Greater Dayton area. The positive response rates for the control measures were 88.4% for screening, 83.6% for treatment, 80.6% for personal hygiene, 95.4% for environmental control, 80.4% for education and 84.3% for standard precautions. The study also compared rural and urban counties for their differences in prevention and control preparedness activities. The greatest difference among control measures for urban versus rural county facilities were 90% and 66.7% respectively for personal hygiene. However analysis indicates no significant difference. This study suggests a significant compliance with MRSA prevention and control protocols among correctional facilities in the Greater Dayton area.

## **Introduction**

*Staphylococcus aureus* is a bacteria that is commonly carried on the skin or in the nose of healthy people. Approximately 25 to 30% of the population is colonized with staphylococcus. Staphylococcus that is resistant to beta-lactam antibiotics including methicillin and other antibiotics such as oxacillin, penicillin, and amoxicillin is commonly called methicillin-resistant *Staphylococcus aureus* (MRSA) (32).

Approximately 1 to 8% of the population is colonized with MRSA. It often causes



infections such as abscessed hair follicles, boils or multiple boils called furunculosis. Although infections normally remain localized to the skin, it can progress to sepsis and musculoskeletal infections. MRSA has also been associated with necrotic pneumonia. This is characterized by necrotic lesions of the trachea and lung tissue resulting in severe damage to the lungs (12).

MRSA has been a problem in the medical setting for decades and is commonly called healthcare-associated MRSA (HA-MRSA). However, recently there have been an increasing number of cases of MRSA in non-medical settings, including health clubs, athletic teams and correctional facilities. This genetically distinct strain is called community-associated MRSA (Ca-MRSA) (12,32). Although Ca-MRSA often is not as antibiotic resistant as HA-MRSA, certain virulence factors may allow community strains to spread more easily and cause more serious infections (32).

The potential health impact of MRSA in correctional facilities can be great. The *Morbidity and Mortality Weekly Report* reported that, during 2002 approximately 2 million prisoners in the United States were incarcerated at any given time, and one in every 142 U.S. residents were in prison or jail. With overcrowding and other factors, prisons and jails can serve as amplifiers of MRSA skin disease (1).

The purpose of this study is to better understand the preparedness of county-level correctional facilities in the prevention and control of MRSA and to provide useful information to help with MRSA prevention and control preparedness activities in a large metropolitan city in southwestern Ohio and the surrounding areas which will be referred to as the Greater Dayton Area.

## **Literature Review**

Investigation of several outbreaks in the United States, as reported by the Centers for Disease Control, identified at least four factors that contribute to the problem of MRSA in correctional institutions. These factors are hygiene, inmate screening for MRSA, medical care and education.

### **Hygiene**

The first factor was improper or insufficient hygiene. Often there is little access to hand washing soap or alcohol disinfectant hand-rubs due to safety or misuse issues. Behavioral or mental problems also contribute to issues of poor personal hygiene (1). In a case-control study by G. Turabelidze, poor personal hygiene was significantly associated with the increased risk of MRSA transmission in a MRSA outbreak in a women's correctional facility. Lower frequency of hand washing, less than 6 times per day, was associated with a significant increase in MRSA transmission, as compared to those who washed their hands greater than 12 times per day. In addition, those inmates who showered less than 7 times per week had a more significant increase in MRSA risk than those who showered greater than 14 times per week (2).

The Federal Bureau of Prison MRSA guidelines recognize hand hygiene as the simplest and most important infection control measure for preventing and containing MRSA. However, it is often very difficult to implement. To prevent the spread by correctional facility workers, it is recommended that hands are washed before eating, after using the lavatory, when hands are visibly dirty, and when there has been contact with blood or other body fluids. When working with an infected inmate, hands should be

washed before and after contact, even if the officer was wearing gloves. Hands should be washed for at least 15 seconds with soap and water (13). The use of antiseptic soaps is strongly recommended for healthcare workers, and the CDC also recommends the use of antiseptic soaps for inmates as well (13,14).

The use of alcohol-based antiseptics by inmates can be problematic in the correctional facility. However, there are other antiseptics that may be acceptable. Chlorhexidine gluconate was developed in the 1950's and introduced into the United States in the 1970's. It has a low toxicity, proven efficacy against a number of pathogens, including gram positive organisms such as MRSA and vancomycin-resistant *enterococci* (VRE), and a prolonged residual affect (15). In a clinical trial by Vernon et al, the use of single 2% chlorhexidine-saturated cloths resulted in a 2.5 log<sub>10</sub> reduction in VRE on patient's skin, compared to soap and water baths in a Medical Care Intensive Care Unit. During the study, 86 patients were cleansed daily with the procedure specific to the study period. The procedures included period 1 (soap and water), period 2 (cleansing with 2% chlorhexidine-saturated cloths) and period 3 (cleansing cloths without chlorhexidine). The patient's skin, healthcare worker's hands and environmental surfaces were then measured for VRE colonization. Besides the significant reduction on the patient's skin, the chlorhexidine patient wash resulted in a reduction on the healthcare worker's hands (risk ratio of 0.6 and 95% confidence interval of 0.4 -0.8) and on environmental surfaces (risk ratio of 0.3 and a 95% confidence interval of 0.2 -0.8) (33).

Triclosan is another effective alternative. Triclosan was developed in the 1960's and is currently incorporated in a number of healthcare worker and consumer soaps. It has been found effective against gram-positive bacteria, including MRSA. Several studies have

shown it to be even more effective in reducing bacterial colonies than chlorhexidine, iodophors, or alcohol-based products (15). It also has a prolonged residual affect on the skin. In a study by Zafar, triclosan was found effective in halting a MRSA outbreak in a neonatal nursery. An outbreak of MRSA was immediately halted after instituting healthcare workers' hand washing and infant bathing protocol using 0.3% triclosan. Infants were bathed after admission and before discharge. Interestingly, in this outbreak, chlorhexidine was used during the initial outbreak, but failed to stop the spread of MRSA (16).

Shared personal items have also been associated with an increased risk of MRSA transmission. In a Mississippi State Prison outbreak in 2000, the Centers for Disease Control reported that 89 % of the cases in this case-control study reported sharing personal items such as linens, pillows, tweezers and clothing. These were items that were potentially contaminated by MRSA drainage (3). In the study by Turabelidze, patients were more likely to have shared personal items. The sharing of nail clippers (odds ratio of 3.30) and shampoo (odds ratio of 3.32) were associated with an increased risk of MRSA transmission (2).

In a study by Nugyen et al., the sharing of bars of soap between football players was associated with the spread of MRSA in an outbreak in a college football team. Cases were 15 times more likely to have shared bars of soap than controls (95% confidence interval of 1.69 – 180; P-value of .005) (6). In addition, players that were carriers of MRSA were 47 times more likely to have shared towels with teammates (95% confidence interval of 2.02 – 2511; P- value of .005) (6).

## **Inmate Screening**

A second factor noted by the CDC associated with MRSA transmission in correctional facilities is the failure to effectively screen inmates. In a 2002 outbreak in a county jail in Georgia, 13 of the original cases were diagnosed incorrectly as spider bites.

Bacterial cultures later identified these cases as MRSA. In addition, after instituting routine screening of MRSA, 59 additional cases were identified <sup>(1)</sup>. Georgia is not alone in the failure to screen inmates properly. Prior to September, 2001, Los Angeles County Jail, the largest county jail in the country, was also attributing many MRSA cases to “spider bites”. In September of 2001, the jail started screening inmates for MRSA skin infection, including those that appeared to be “spider bites”. By June of 2003, 1697 cases were identified with 14 % of those cases identified within 5 days of incarceration <sup>(1)</sup>.

Screening of MRSA can be performed either through active or passive surveillance <sup>(23)</sup>. Passive surveillance consists of inmates presenting themselves to medical staff with a skin lesion. However, this approach is reactive and may result in additional cases prior to the primary case presenting themselves to medical staff. It is recommended that facilities institute active surveillance. The Federal Bureau of Prisons recommends screening all inmates prior to incarceration from the community and transfers from other facilities and inmates with skin complaints. Those inmates who have been exposed to a MRSA-infected individual, particularly if the exposed person is an at-risk individual such as one who has been colonized previously with MRSA, hospitalized recently or has a poor immune system should be screened as well <sup>(14)</sup>.

Screening consists of both an interview and a physical examination. In medical settings, active screening also includes testing for MRSA colonization, though this is not recommended by the Federal Bureau of Prisons for correctional facilities (22,14). The recommendation not to screen is related to the significant increase in costs associated with testing for colonization.

In a study by Tomic et al., the University Clinic of Respiratory and Allergic Diseases in Slovenia instituted a 5-year program of early detection, consisting of MRSA colonization testing, followed by improved hand hygiene and decolonization of MRSA. After its institution in 1999, the annual incidence of MRSA carriage per 1000 admissions actually increased from 4.5 in 1998 to 8.0 in 1999 ( $P=0.02$ ) as a result of the early detection program and remained there for the study period. However, during the study period, the proportion of cases acquired from the hospital decreased from 50 % of MRSA cases in 1999 to only 6.1% of MRSA cases by 2002 ( $P<.001$ ) (17). Although it is impossible to determine what proportion each intervention played in this study, it was evident that an active screening program, in conjunction with personal hygiene and treatment, was associated with a significant decrease in nosocomial infection.

### **Medical Care**

A third factor noted by the Centers for Disease Control in the control of MRSA was proper medical care. In a county jail outbreak in Georgia, a review of medical records of 50 patients revealed the improper use of antibiotics in 26 % of the cases (1). Although it is important to prescribe the correct antibiotics, a conservative approach to treatment may be more advisable for minor skin infections. The conservative approach consists of warm soaks or compresses for 20 minutes 2-3 times per day, in conjunction with incision or

drainage (13,14). In this way, the skin infection may clear itself without the use of antibiotics. If, after several days of warm soaks, the infection does not clear, then antibiotic use may be indicated. For less complicated infections, trimethoprim-sulfamethoxazole, doxycycline or clindamycin may be prescribed. However, trimethoprim-sulfamethoxazole is not FDA-approved for MRSA treatment, despite its recommendation by Federal Bureau of Prison guidelines. Other options for the treatment of MRSA include minocycline and linezolid. Rifampin may be prescribed when used with other agents. Intravenous vancomycin may be administered for more serious infections such as sepsis or pneumonia (13). Interestingly, a retrospective study by E. Pan et al. of the San Francisco Jail revealed an increase in methicillin-resistant *Staphylococcus aureus* prevalence from 29 % in 1997 to 74% in 2002. The various clonal groups of MRSA showed significant resistance to an array of different antibiotics, including ciprofloxacin, gentamicin, erythromycin, rifampin, tetracycline, clindamycin and trimethoprim-sulfamethoxazole (18). To effectively treat MRSA, it is important to rely on bacterial cultures and antibiotic susceptibility results rather than routinely prescribing the same antibiotic (13). It is also important to rely on directly observed antibiotic therapy by nursing personnel. Failure of inmates to properly administer their own antibiotics can result in further antibiotic-resistant organisms.

### **Patient Education**

The fourth factor in MRSA control is patient education. Due to high turnover rates in medical personnel in correctional facilities, patient education may be lacking. The Centers for Disease Control recommend that education include hand washing, avoiding the sharing of personal items and contacting contaminated dressings, lesions or drainage

from infected individuals. In addition, education should be work-specific for laundry, healthcare, kitchen and housekeeping personnel (14). The Federal Bureau of Prison guidelines include all aspects of MRSA education including transmission, prevention, treatment and containment (13).

### **Sanitation and Environmental Control**

The Centers for Disease Control and the Federal Bureau of Prisons both recommend proper sanitation and environmental control to prevent MRSA spread. The guidelines include disinfecting with an approved disinfectant and washing all surfaces during and after cell occupancy. Exercise equipment should be cleaned routinely, particularly weight benches. Laundry should be washed with hot water (over 160° F) for 25 minutes and dried completely. Linens should be changed every other day or more often if soiled (13,14).

Despite recommending strict adherence to environmental controls, the evidence is mixed on the relationship of environment and MRSA rates. In a study by D. Green et al., data from the National Health Service Hospitals of England showed no correlation between the cleanliness of a hospital and the rates of MRSA transmission ( $P > .05$ ). Despite the increase in cleanliness scores from 2001-2005, MRSA rates had not changed significantly ( $P = .443$ ). It was the researcher's contention that there is a lack of evidence to support that inanimate objects impact MRSA infection (16). *The Control of Communicable Diseases Manual* by the American Public Health Association states this mode of transmission for staphylococcus is overstated (10).

However, in a descriptive study by Rampling et al. in England, the results supported sanitation as a measure to control MRSA. In this study, MRSA rates were studied before and after a sanitation intervention in a male surgical ward. Cleaning measures were



increased from 63.5 hours a week to 123.5 hours a week. The cleaning protocol consisted of cleaning ventilation ducts, radiators, equipment and curtain laundering. After 6 months, only 3 people were reported to be colonized with MRSA, compared to 30 before the intervention. Environmental swabs following the interventions revealed no MRSA colonies (21).

The Centers for Disease Control note that overcrowding may be a condition that makes incarcerated individuals susceptible to MRSA transmission (14,1). With a 300 % increase in incarcerated individuals since 1980, this may become a relevant condition for MRSA transmission. Presently, there have been no studies on the effect of overcrowding on the spread of MRSA in correctional facilities. However, in a study by Borg, the incidence of MRSA and bed occupancy rates were studied over a 24-month period at St. Luke's Hospital in Malta. A significant positive correlation was noted between new cases of MRSA and overall bed occupancy (Pearson's coefficient of correlation of 0.463 &  $P < .05$ ) (20). Incidentally, the author's investigation of a MRSA outbreak in a county jail in the Greater Dayton Area occurred during a significant period of overcrowding. Methods of managing facility overcrowding may assist jail administrators in alleviating conditions that promote MRSA transmission.

## **Methods**

A survey was conducted to examine MRSA prevention and control activities of nine participating county level correctional facilities in the Greater Dayton Area. A questionnaire was administered via mail to correctional facility administrators. This questionnaire is based on guidelines by the Centers for Disease Control, Federal Bureau of Prisons and local infectious disease specialists for the management of MRSA. The

survey collected information regarding several control measures, including screening, treatment, personal hygiene, environmental control, education and standard precautions. The data collected is reported as cumulative capabilities with gaps in MRSA prevention and control in correctional facilities in the Greater Dayton Area.

Survey questions with no response or marked Not Applicable (N/A) were not included in the statistical analysis. Response rates were determined by the number of “yes” responses divided by the total of “yes” and “no” responses. Statistical significance for comparisons of urban and rural counties was determined by using a 2x2 contingency table with the Fishers Exact Test and 2 tailed P- value (27). A 2 tailed P-value of .05 or lower was considered significant. For this study, rural counties are defined as counties with populations less than 55,000, while urban counties were defined as counties with populations greater than 100,000.

The survey consisted of 45 questions in which 8 were screening, 9 were treatment, 4 were personal hygiene, 7 were environmental control, 7 were education and 10 were standard precautions. Of those 9 counties surveyed, responses were collected from all nine (100%).

## **Results**

### **Screening**

Of those county facilities that answered either “yes” or “no” to the 8 screening questions, there were 61 “yes” responses out of a total of 69 “yes” or “no” responses, for an overall positive response rate of 88.4% (Table 1)(Figure 1). The positive response rates for the urban versus rural county counties were 86.7% and 91.7% respectively (Figure 2).

Four counties responded “yes” to all 8 screening questions. All nine counties responded “yes” to the following three screening questions:

- Does staff perform an interview on newly incarcerated inmates from the community?
- Does staff perform an interview on inmates complaining of skin lesions?
- Does staff perform a physical examination on inmates complaining of skin lesions?

Of those counties that answered “yes” or “no”, only 4 of 8 (50%) responded “yes” to the following question:

- Does staff perform a physical examination on inmates exposed to a MRSA infected individual?

Interestingly, of the rural counties (population less than 55,000), 2 out of 3 (66%) do perform a physical examination on inmates exposed to a MRSA-infected individual.

There was no significant difference between screening new incarcerated inmates from the community versus those from other correctional facilities. Of the combined responses to questions regarding performing an interview and physical examination on inmates from the community, 17 out of 18 (94%) responses were positive versus 16 out of 17 (94%) responses were positive to performing an interview and physical examination on inmates from other facility.

## **Treatment**

Of those nine county facilities that either answered “yes” or “no” to the 9 treatment questions, there were 61 “yes” responses out of a total of 73 “yes” or “no” responses, for an overall positive response rate of 83.6% (Table 2)(Figure 1). The positive response rates

for the urban versus rural county counties were 82% and 87% respectively (Figure 2). One county responded “yes” to all nine questions. The following questions had a 100% positive response rate from those facilities that responded “yes” or “no”:

- Are dressings changed daily by a healthcare worker?
- Does staff use only antibiotics that are recommended for MRSA?
- When skin lesions still appear infected, are patients re-evaluated for continuation of antibiotic use, drainage of lesion and possible nasal decolonization?
- Are patients monitored for side affects and proper use of antibiotics?

Of those counties that answered “yes” or “no”, only 4 of 9 (44%) responded “yes” to the following question:

- Is antibiotic therapy only used as an addition to drainage and care of an infected site?

Among the rural counties, 2 out of 3 (66%) use antibiotic therapy as only an addition to drainage and care of an infected site.

### **Personal Hygiene**

Of those nine county facilities that either answered “yes” or “no” to the 4 personal hygiene questions, there were 25 “yes” responses out of a total of 31 “yes” or “no” responses, for an overall positive response rate of 80.6% (Table 3)(Figure 1). The positive response rates for the urban versus rural county counties were 90% and 66.7% respectively.(Figure 2) Three counties responded “yes” to all four questions. The

following questions had a 100% positive response rate from those facilities that responded “yes” or “no”:

- Are hand washing sinks readily accessible for inmates and staff?

Of those counties that answered “yes” or “no”, only 4 out of 7 (57%) responded “yes” to the following question:

- Are alcohol based hand sanitizers available during an outbreak?

Although only 57 % allow alcohol-based hand sanitizers, 75 % responded positively to allowing inmates access to antibiotic soap for hand washing. Interestingly, only 1 out of 3 (33%) rural counties allow inmates access to antibiotic soap for hand washing, while 5 out of 5 urban locations allowed access to antibiotic soap.

### **Environmental Control**

Of those nine county facilities that either answered “yes” or “no” to the 7 environmental control questions, there were 54 “yes” responses out of a total of 56 “yes” or “no” responses, for an overall positive response rate of 95.4% (Table 4)(Figure 1). The positive response rates for the urban versus rural county counties were 100% and 89.5% respectively (Figure 2). Three counties responded “yes” to all 7 questions. The following questions had a 100% positive response rate from those facilities that responded “yes” or “no”:

- Does staff properly dispose of single-service medical equipment used in the care of MRSA infected inmates?
- Does staff properly dispose of dressings?

- Is an approved detergent sanitizer used for daily cleaning?
- Is hot water over 160° F for 25 minutes used to properly wash laundry?
- Is laundry completely dried before removing from dryer?

### **Education**

Of those nine county facilities that either answered “yes” or “no” to the 7 education questions, there were 45 “yes” responses out of a total of 56 “yes” or “no” responses, for an overall positive response rate of 80.4% (Table 5)(Figure 1). The positive response rates for the urban versus rural county counties were 76.2% and 92.9% respectively (Figure 2). Two county facilities responded “yes” to all seven education questions. All nine counties responded “yes” to the following two education questions:

- Are inmates educated regarding the sharing of personal items?
- Is work-specific training performed for healthcare workers?

Of those counties that answered “yes” or “no”, only 2 out of 6 (33%) responded “yes” to the following question:

- Is work-specific training performed for housekeeping?

All three rural counties responded “Not Applicable” to the preceding question.

### **Standard Precautions for Facility Personnel**

Of those nine county facilities that either answered “yes” or “no” to the 10 standard precautions for facility personnel questions, there were 70 “yes” responses out of a total of 83 “yes” or “no” responses, for an overall positive response rate of 84.3% (Table 6)(Figure 1). The positive response rates for the urban versus rural county counties were 85.6% and 82.1% respectively (Figure 2).

All nine counties responded “yes” to the following five questions:

- Does staff wash hands before patient contacts?
- Does staff wear gloves when in contact with blood and body fluids?
- Does staff change gloves between tasks and wash hands after removing gloves?
- Does staff practice hand hygiene after contact with blood and body fluids?
- Does staff protect eyes when splash of body fluids is possible?

Of those counties that answered “yes” or “no”, only 2 out of 9 (29%) responded “yes” to the following question:

- Are inmates with MRSA skin disease assigned to cells with other infected inmates?

When asked “are inmates with skin disease isolated until etiology is defined”, 4 out of 8 (50%) responded “yes”. Of those counties that responded, 2 out of 3 (66%) of the rural counties responded positively, while only 2 out of 5 (40%) urban counties responded positively.

**Table 1. Cumulative and individual facility response rates for screening questions.**

Facility	A	B	C	D	E	F	G	H	I		
Screening Question										<b>Y Sum</b>	<b>Response Rate</b>
A	Y	Y	Y	Y	Y	Y	Y	Y	Y	<b>9</b>	<b>100%</b>
B	Y	Y	Y	Y	Y	N	Y	Y	Y	<b>8</b>	<b>88.90%</b>
C	Y	Y	Y	Y	Y	Y	Y	Y	Y	<b>9</b>	<b>100%</b>
D	Y	N/A	Y	Y	N	Y	Y	Y	Y	<b>7</b>	<b>87.50%</b>
E	Y	Y	Y	Y	Y	Y	Y	Y	Y	<b>9</b>	<b>100%</b>
F	Y	Y	Y	Y	Y	Y	Y	Y	Y	<b>9</b>	<b>100%</b>
G	Y	N/A	Y	Y	Y	N	N	Y	Y	<b>6</b>	<b>75%</b>
H	Y	N/A	N	Y	N	N	N	Y	Y	<b>4</b>	<b>50%</b>
Y Sum	<b>8</b>	<b>5</b>	<b>7</b>	<b>8</b>	<b>6</b>	<b>5</b>	<b>6</b>	<b>8</b>	<b>8</b>		
Response Rate	<b>100%</b>	<b>100%</b>	<b>87.50%</b>	<b>100%</b>	<b>75%</b>	<b>62.50%</b>	<b>75%</b>	<b>100%</b>	<b>100%</b>		
Population	<b>Urban</b>						<b>Rural</b>				



**Table 2. Cumulative and individual facility response rates for treatment questions.**

Facility	A	B	C	D	E	F	G	H	I		
Treatment Question										<b>Y Sum</b>	<b>Response Rate</b>
I	Y	N/A	N	N	Y	Y	Y	N/A	Y	<b>5</b>	<b>71.40%</b>
J	Y	N/A	Y	N	Y	Y	Y	Y	N	<b>6</b>	<b>75%</b>
K	Y	N/A	Y	Y	Y	Y	Y	Y	Y	<b>8</b>	<b>100%</b>
L	N	N	Y	N	Y	N	N	Y	Y	<b>4</b>	<b>44.40%</b>
M	Y	Y	Y	Y	Y	Y	Y	N/A	Y	<b>8</b>	<b>100%</b>
N	Y	N/A	Y	N	Y	Y	Y	Y	N	<b>6</b>	<b>75%</b>
O	Y	Y	Y	N	Y	Y	Y	N/A	Y	<b>7</b>	<b>87.50%</b>
P	Y	Y	Y	Y	Y	Y	Y	N/A	Y	<b>8</b>	<b>100%</b>
Q	Y	Y	Y	Y	Y	Y	Y	Y	Y	<b>9</b>	<b>100%</b>
Y Sum	8	4	8	4	9	8	8	5	7		
Response Rate	88.90%	80%	88.90%	44.40%	100%	88.90%	88.90%	100%	77.80%		
Population	Urban						Rural				

**Table 3. Cumulative and individual facility response rates for personal hygiene questions.**

Facility	A	B	C	D	E	F	G	H	I			
Personal Hygiene Question										<b>Y Sum</b>	<b>Response Rate</b>	
R	Y	Y	Y	N/A	Y	Y	Y	N	Y	<b>7</b>	<b>87.50%</b>	
S	Y	Y	Y	N/A	Y	Y	N	N	Y	<b>6</b>	<b>75%</b>	
T	Y	Y	Y	N/A	Y	Y	Y	Y	Y	<b>8</b>	<b>100%</b>	
U	N	Y	N	N/A	Y	Y	N	N/A	Y	<b>4</b>	<b>57.10%</b>	
Y Sum	3	4	3	0	4	4	2	1	4			
Response Rate	75%	100%	75%	0%	100%	100%	50%	33.30%	100%			
Population	Urban						Rural					

**Table 4. Cumulative and individual facility response rates for environmental control questions.**

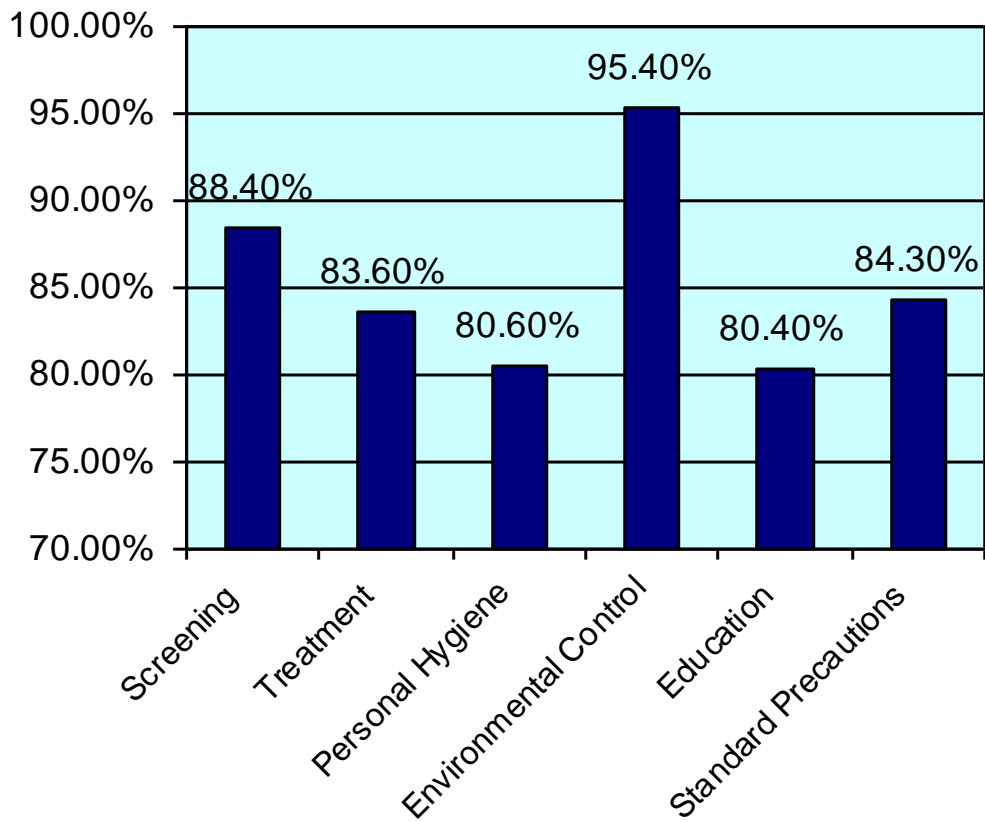
Facility	A	B	C	D	E	F	G	H	I			
<b>Environmental Control</b>										<b>Y Sum</b>	<b>Response Rate</b>	
V	Y	Y	Y	N/A	Y	Y	Y	N	Y	7	87.50%	
W	Y	Y	Y	Y	Y	Y	Y	N/A	Y	8	100%	
X	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	100%	
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	100%	
Z	Y	N/A	Y	Y	Y	Y	N	Y	N/A	6	85.70%	
AA	N/A	N/A	Y	Y	Y	Y	Y	Y	Y	7	100%	
BB	Y	N/A	Y	Y	Y	Y	Y	Y	Y	8	100%	
<b>Y Sum</b>	6	4	7	6	7	7	6	5	6			
<b>Response Rate</b>	100%	100%	100%	100%	100%	100%	85.70%	83.30%	100%			
<b>Population</b>	Urban						Rural					

**Table 5. Cumulative and individual facility response rates for education questions.**

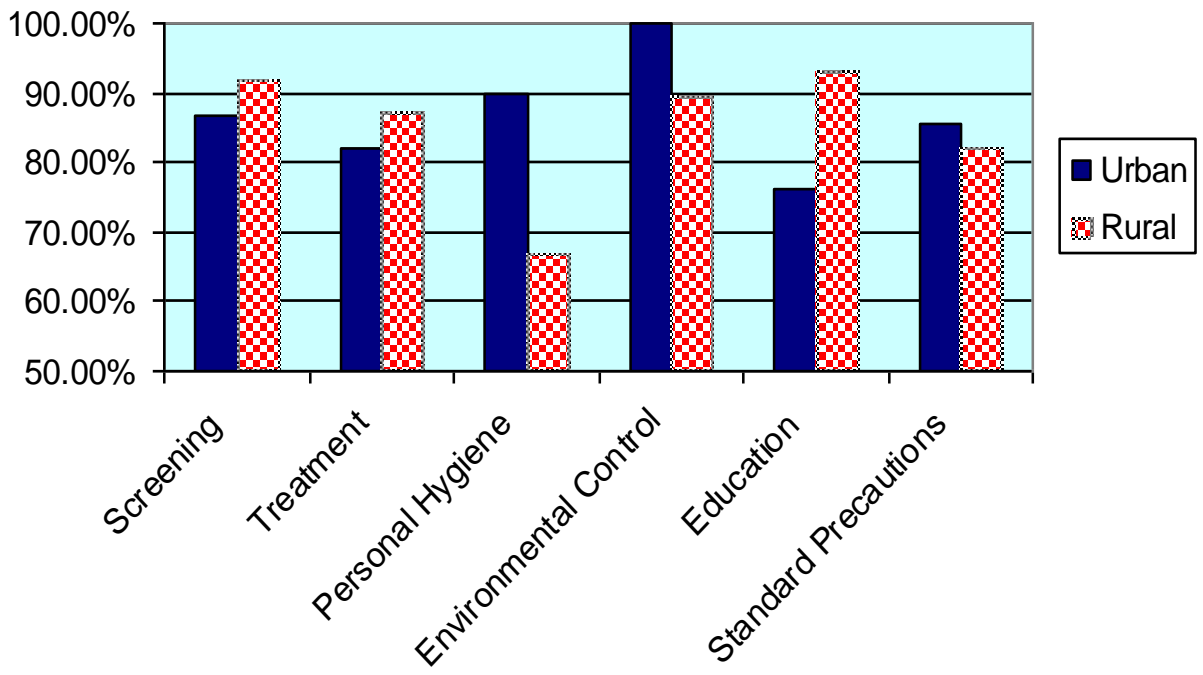
Facility	A	B	C	D	E	F	G	H	I			
Education Question										<b>Y Sum</b>	<b>Response Rate</b>	
CC	N	Y	Y	Y	Y	Y	Y	Y	Y	<b>8</b>	<b>88.90%</b>	
DD	N	Y	Y	Y	Y	Y	Y	N	Y	<b>7</b>	<b>77.80%</b>	
EE	Y	Y	Y	Y	Y	Y	Y	Y	Y	<b>9</b>	<b>100%</b>	
FF	Y	Y	N	N	Y	Y	Y	N/A	N/A	<b>5</b>	<b>71.40%</b>	
GG	Y	Y	Y	Y	Y	Y	Y	Y	Y	<b>9</b>	<b>100%</b>	
HH	Y	Y	Y	N	Y	N	Y	N/A	N/A	<b>5</b>	<b>71.40%</b>	
II	N	Y	N	N	Y	N	N/A	N/A	N/A	<b>2</b>	<b>33.30%</b>	
Y Sum	4	7	5	4	7	5	6	3	4			
Response Rate	57.10%	100%	71.40%	57.10%	100%	71.40%	100%	75%	100%			
Population	Urban						Rural					

**Table 6. Cumulative and individual facility response rates for standard precaution questions.**

Facility	A	B	C	D	E	F	G	H	I	Y Sum	Response Rate
Standard Precaution Question											
JJ	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	100%
KK	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	100%
LL	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	100%
MM	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	100%
NN	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	100%
OO	Y	Y	Y	Y	Y	Y	N	Y	Y	8	88.90%
PP	Y	Y	Y	Y	Y	Y	Y	N/A	Y	8	100%
QQ	N/A	N/A	N	N/A	Y	N	N	Y	Y	3	50%
RR	Y	N/A	N	N	N	Y	N	Y	Y	4	50%
SS	Y	N/A	Y	N	N	N	N	N/A	N	2	28.60%
Y Sum	9	7	8	7	8	8	6	8	9		
Response Rate	100%	100%	80%	77.80%	80%	80%	60%	100%	90%		
Population	Urban						Rural				



**Figure 1. Positive response rates to MRSA Control Measures.**



**Figure 2. Urban vs. Rural positive response rates to MRSA Control Measures.**

## Discussion

According to the Centers for Disease Control, a major factor in the spread of MRSA in correctional facilities has been the failure of facilities to properly screen inmates. In this survey, the county facilities performed exceptionally well on performing interviews and physical examination for newly incarcerated inmates from both the community and other facilities, with a 94 % positive response rate for screening both inmates from the community and from other correctional facilities. This pro-active approach benefits the facility by preventing MRSA from entering the facility and initiating an outbreak. Since containing a MRSA outbreak in a correctional facility can be difficult and expensive, preventing its introduction into the facility can be cost-effective. At a national level, between \$1.5 billion to \$4.2 billion are spent in excess hospital costs per year with direct medical costs per patient of between \$27,000 and \$35,000. In a UK study of a 4 year intervention of a 16 bed medical/surgical adult ICU, admission swabbing, isolation of positive screens and body decontamination with 4% chlorhexidine and MRSA nasal creams prevented several hundred cases of MRSA acquisition and saved over a 1,000,000 £ in occupied bed-days. The total cost of the intervention was about 20,000 £ <sup>(31)</sup>. In addition, an initial screening of newly incarcerated inmates can identify those individuals that are at greater risk of contracting a MRSA infection. Compared to the general population, inmates tend to have an elevated risk of infection and chronic diseases. Diseases such diabetes, circulatory diseases, renal disease, skin diseases such as psoriasis and eczema, as well as HIV, may lead to an increased risk of acquiring MRSA infection <sup>(30)</sup>. Preventing those individuals with risk factors for MRSA acquisition from being exposed to infected individuals, may reduce the risk of MRSA transmission in the correctional facility.



Equally impressive was the facilities' response to inmates' complaints of skin infection, with 100 % of the correctional facilities performing an interview and physical examination on inmates complaining of skin lesions. Failure of staff to take inmates' complaints seriously may result in an increased risk of inmates self-treating, resulting in complications, as well MRSA spread. In an outbreak in 2002, a CDC investigation of a 1500 bed facility in Georgia revealed that inmate's self-draining of boils was a risk factor in the spread of MRSA in that facility. In the Mississippi State Prison outbreak in 2000, 26 (58%) reported lancing their own boils or other inmates' boils with fingernails or tweezers (3).

The facilities' response to performing an interview or physical examination on those inmates who have been exposed to a MRSA-infected individual was less impressive. 75% of the respondents perform an interview and only 50 % perform a physical examination. Since MRSA is most often spread by direct contact with an infected individual, examining an exposed individual may be beneficial. In a study by Campbell et al. of an outbreak in military trainees in San Diego, California, in 2002, just having a roommate with a MRSA skin infection increased the risk of transmission substantially (5). In addition, a carrier control-study by Nguyen et al. of a 2003 outbreak of MRSA skin infection among a college football team documented that proximity of a locker near a teammate with a skin infection was associated with MRSA nasal carriage (6).

In this survey, the term exposed was not defined. If the question had been rephrased and facilities were asked if they perform an interview or physical examination on those inmates who had direct personal contact to a MRSA infected individual, the response may have been higher.

Inadequate medical care was another factor associated with MRSA transmission in correctional facilities. In this survey, the overall positive response rate to the treatment questions was 83.6%. Although the rate for treatment is lower than for screening, the correctional facilities scored significantly high in regards to antibiotic treatment. The facilities scored high with 100% using only approved antibiotics, performing susceptibility tests and adjusting antibiotic treatments, and monitoring inmates for side effects and the proper use of antibiotics. In a CDC investigation of an 2002 outbreak in a 2800 bed county jail in Georgia, in 26% of the cases , beta-lactam antimicrobials were improperly prescribed with 18 % prescribed before culture results were available and 8 % prescribed after results indicated MRSA. No treatment protocols were in place prior to the outbreak. In the Los Angeles County outbreak in which 1697 cases of MRSA were identified from September 2001, to June 2003, no standardized protocol for the use of non-beta lactam antimicrobials was in place which might have contributed to diminished control of the outbreak (1).

The importance of a standardized treatment protocol cannot be overstated. In a study by Goldstein et al., the authors compared infection rates before and after the implementation of a standardized treatment protocol in the San Diego County Jail system in 2002. The guideline reduced the proportion of soft tissue infections caused by MRSA from 93.3% to 57.8% and decreased the proportion of inmates diagnosed with MRSA after 10 days in custody. Resolution of infection improved from 30.7% to 68.7% of cases. The average number of different antibiotic regimens per patient decreased from 3.06 to 1.78 (8).

Although the county facilities appear to score well in the use of antibiotics, only 44% of those responding counties use antibiotic therapy to supplement drainage and incision. The Federal Bureau of Prisons strongly recommends a conservative approach of using warm soaks or compresses routinely prior to administering antibiotics. However, in a retrospective cohort study by Ruche et al., they contend that active antimicrobial therapy, in conjunction with drainage, is associated with a statistically significant improvement in clinical outcome. In their hospital study, the success rate was 95% with combined therapy, compared to 87 % with incision and drainage only (26). The problem with this strategy is that, not only does it increase cost significantly for a moderate increase in outcome, but may result in an increased antimicrobial resistance from the overuse of antibiotics. It may be useful over the course of an outbreak for a limited period of time.

As noted in the results, 2 out of 3 (66%) of the rural counties use antibiotic therapy to supplement drainage and care of an infected site, while only 2 out of 5 urban facilities do. However, using the 2x2 contingency table with Fishers Exact test, the 2 tailed P-value is 0.5 (27). The value of 0.5 indicates that there is no significant difference between urban and rural counties in using antibiotic therapy to supplement drainage and care of an infected site. However, this is a limited sample because of small numbers and perhaps a larger sample would have a different outcome. Rural counties with a more limited budget may try a less expensive and more conservative approach to treatment than urban counties.

The overall positive response score of 83.6% may underestimate to some degree the compliance with treatment recommendations. Facility “B” reported “Not Applicable” to several questions regarding treatment because inmates are sent to the local hospital.

Although facility “A” reported a high positive response to the treatment questions, they did indicate that if an inmate requires a higher level of care, then the inmate is sent outside the facility.

Poor personal hygiene has been a major contributor to MRSA outbreaks in correctional facilities. In this survey, the overall positive response rate to the personal hygiene questions was 80.6%. The 100% positive response rate for access to hand washing sinks is encouraging. However, during a MRSA outbreak investigation of a county facility performed by the author, correctional facility hand washing facilities often provide a limited amount of water for hand washing. Many have a drinking fountain design in which the inmate must keep one hand on the button while placing the other hand under a small stream of water. This makes washing hands for 15 seconds as recommended by the Federal Bureau of Prisons very difficult, leading to improperly sanitized hands. Considering the limited effectiveness of the hand washing sink, the use of antibiotic soap recommended by the CDC may be advisable. In this survey, 75% of the respondents allow access to antibiotic soaps. However, only 57 % of the respondents allow access to alcohol-based hand sanitizers for routine use during an outbreak. Comments on the survey indicate that the low use of alcohol-based hand sanitizers is at least partially due to the inmates attempting to drink it. This was also reported in a Mississippi State Prison outbreak in 2000.

A study by Zinderman et al. of a MRSA outbreak in a large military training facility in the southeastern United States underscores the importance of personal hygiene. In this training facility, recruits had access to showers and hand washing, but limited time for cleaning which may have lead to deficient hygiene practices. In response, facility

personnel implemented a hygiene protocol that included antibacterial soaps and hand sanitizers at all recruit sinks, and hand washing was recommended as frequently as possible. All recruits were given personal bottles of hand sanitizer for use when soap and water were not available. Daily showers of adequate duration were enforced along with prohibiting the sharing of personal items. In one month's time, the number of cases and the incidence rate declined by half and continued to decrease over the following two months (4).

As noted in the results, only 1 out of 3 (33%) of the rural counties allow inmates access to antibiotic soap for hand washing, while 5 out of 5 urban locations allowed access to antibiotic soap. While at first glance it appears that there is a significant difference, using a 2x2 contingency table with the Fishers Exact test the 2 tailed P-value is 0.1071 (27). The value of 0.1071 indicates that there is no significant difference between urban and rural counties in the Dayton area. However, this is once again a small sample and maybe a larger sample would show a significant difference. The rural counties with more limited budgets and possibly less issues with MRSA may not desire to use antibiotic soap.

The personal hygiene positive response rates for the urban versus rural counties were 90% and 66.7% respectively, with a P-value of 0.1651 (27). This value indicates no significant difference between urban and rural counties in the Dayton area in regards to personal hygiene response rates.

In this survey, Facility "D" failed to respond to the personal hygiene questions. Their response to the personal hygiene questions may have had a significant impact on the

overall score considering the limited number of facilities surveyed and number of personal hygiene questions.

The Federal Bureau of Prisons and the Centers for Disease Control recommend strict sanitization measures to prevent and control MRSA spread. In this survey, there was an overall positive response rate of 95.4% to the environmental control questions, indicating a high adherence to sanitation measures. Despite mixed results from studies on sanitation and control of MRSA, the facilities' high positive response rates clearly show acceptance of Federal Bureau of Prisons and Centers for Disease control guidelines.

The Federal Bureau of Prisons and the CDC recommend that staff and inmates be trained on prevention, transmission, treatment and control with emphasis on hand hygiene. All inmates should be instructed in regular hand washing, maintaining personal hygiene including regular showers, and importance of keeping wounds covered. Inmates should also be instructed on changing linens regularly, particularly if soiled with wound drainage. Inmates should also be instructed on the importance of not sharing personal items (13). The overall response rate to the education questions was 80.4 % with a 100% positive response rate for training for healthcare workers. However, training for cleaning personnel, such as laundry and housekeeping, was significantly lower, 71% and 33% respectively. In light of improper laundry procedures possibly contributing to MRSA outbreaks, education is important for laundry and housekeeping personnel. Awareness level training on MRSA for laundry and housekeeping personnel may prevent workers from inadvertently spreading MRSA. Smaller rural facilities may not use laundry and housekeeping personnel and that may reflect the large number of "Not Applicable" (N/A) responses.

Standard precautions used in the hospital setting can be employed to control transmission of infection in the correctional facility as well. In this study, the overall positive response rate to the standard precaution questions was 84.3%. However, the response rate for questions concerning isolation and cohorting were considerably lower with positive response rates of 50% and 29% respectively. The low rates may be due to the lack of available space due to overcrowding in many urban jails. The outcomes for isolation and cohorting in jail systems are mixed. Michael Kelley M.D., Director of Preventive Medicine for the Texas Department of Criminal Justice, reports that the cohorting of MRSA-infected individuals, along with the use of chlorhexidine washes, was ineffective in the control of MRSA in their system (25). However, he does indicate that it is not clear whether the intervention was ineffective or the implementation was inadequate (25). In contrast, Goldstein et al. in their treatment protocol require patients who have MRSA-positive cultures be housed alone or cohorted until their wounds are healed. Their protocol was very effective in the control of MRSA in the San Diego Jail system (8).

The data from this study of the MRSA prevention and control preparedness in county correctional facilities in the Dayton area is interesting. Obviously, much more research is needed in regards to MRSA and correctional facilities. This study had a limited number of participants which makes comparisons difficult and statistical analysis limited. Although there appeared to be some potential differences between urban and rural counties, the small numbers may not represent true rates of compliance or response. Expanding the geographic area surveyed may be useful. It would also allow for comparisons of the Dayton metropolitan area with other areas around the state.

In addition to expanding the geographic region to be surveyed, obtaining MRSA incidence rates from each facility may allow for interesting comparisons between the number of MRSA cases and their overall scores on the various control measures.

There were a number of questions that were either not answered or marked as “Not Applicable”. This may have affected the results. A face-to-face interview instead of a mailed survey may have yielded more complete results.

Much of what we know regarding MRSA transmission comes from research in the healthcare community such as hospitals and long-term care facilities. The applicability of research in hospital settings may not be appropriate for correctional facilities. Interestingly, the transmission of MRSA in correctional facilities may have more in common with military units than hospitals. They share some common characteristics such as similar age distributions, crowded living conditions and possible physical and sanitary risk factors (24). Additional studies in MRSA transmission between military barracks and prisons may be complimentary.



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## APPENDIX A

January 28, 2007

Dear Sir or Madam:

My name is Jeff Webb and I am conducting a research project to assess Methicillin-resistant *Staphylococcus aureus* (MRSA) control and prevention preparedness in correctional facilities in the greater Dayton area.

I am the Director of Environmental Health in Champaign County and a student in the *Wright State University* Master of Public Health program. Based upon my interest and experience, and the role that public health departments play in the prevention of disease, I am conducting this research to better understand the preparedness of county-level correctional facilities in the prevention and control of MRSA. All results of the survey will be stored on a computer in a password-protected file and reported only as cumulative capabilities and gaps for the greater Dayton area. The results of the data for your facility will be available at your request using my contact information provided below.

You are invited to participate in this study. The research is expected to involve approximately 20 minutes or less of your time. Your participation in this study is strictly voluntary and you are free not to participate; however, by completing and returning the enclosed survey questionnaire in the self addressed stamped envelope, you imply your consent to participate. There are no risks anticipated by this study and the confidentiality of the information will be maintained. The research may reveal gaps in MRSA control and prevention preparedness; however, your individual correctional facility's data will only be released to you or your facility's designated representative. The anticipated benefit to you is that the data gathered should provide useful information to help with MRSA prevention and control preparedness activities in the greater Dayton area. The information that you provide will not jeopardize your employment with your facility since we are only addressing how correctional facilities prevent and control MRSA.

***Please return the completed survey in the enclosed self addressed stamped envelope within 10 days of the receipt of this letter.***

If you have any questions about giving your consent, or rights as a research participant in this research study, you can call the Wright State University Institutional Review Board at 775-4462. Thank you for your time and consideration.

Sincerely,

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## APPENDIX B

### MRSA Control and Prevention Questionnaire

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*Please answer the following questions either by checking the Yes or No box in regard to practices at your location.*

#### Control Measure: Screening

**Yes No**

- Does staff perform an interview on newly incarcerated inmates from the community?
- Does staff perform a physical examination on newly incarcerated inmates from the community?
- Does staff perform an interview on newly incarcerated inmates from other correctional facilities?
- Does staff perform a physical examination on newly incarcerated inmates from other correctional facilities?
- Does staff perform an interview inmates complaining of skin lesions?
- Does staff perform a physical examination on inmates complaining of skin lesions?
- Does staff perform an interview on inmates exposed to a MRSA infected individual?
- Does staff perform a physical examination on inmates exposed to a MRSA infected individual?

#### Control Measure: Treatment

**Yes No**

- Does staff apply warm soaks and compresses to skin infection daily until infection clears?

- Does staff incise and drain skin lesions when needed?
- Are dressings changed daily by a healthcare worker?
- Is antibiotic therapy only used as an addition to drainage and care of an infected site?
- Does staff use only antibiotics that are recommended for MRSA?
- Does staff culture wounds to identify the cause of the infection?
- Is antibiotic therapy adjusted after results of antibiotic susceptibility are available?
- When skin lesions still appear infected, are patients re-evaluated for continuation of antibiotic use, drainage of lesion and possible nasal decolonization?
- Are patients monitored for side affects and proper use of antibiotics?

### **Control Measure: Personal Hygiene**

**Yes No**

- Does staff encourage daily showering of inmates with soap and water?
- Does staff allow inmates access to antibiotic soap for hand washing?
- Are hand washing sinks readily accessible for inmates and staff?
- Are alcohol based hand sanitizers available during an outbreak?

### **Control Measure: Environmental Control**

**Yes No**

- Does staff regularly clean medical equipment used for the care of MRSA infected inmates?

## Environmental Control (Cont.)

- Does staff properly dispose of single service medical equipment used in the care of MRSA infected inmates?
- Does staff properly dispose of dressings?
- Is an approved detergent sanitizer used for daily cleaning?
- Does staff identify and regularly clean areas exposed to sweat? Ex: Exercise Bench
- Is hot water over 160 F for 25 minutes used to properly wash laundry?
- Is laundry completely dried before removing from dryer?

## Control Measure: Education

Yes No

- Are inmates educated regarding avoiding touching lesions, drainage or dressings of another infected inmate?
- Are inmates educated regarding washing hands after contacting an infected inmate?
- Are inmates educated regarding avoiding the sharing of personal items?
- Is work specific training performed for laundry personnel?
- Is work specific training performed for healthcare personnel?
- Is work specific training performed for kitchen workers?
- Is work specific training performed for housekeeping?

## Control Measure: Standard Precautions for Facility Personnel

Yes No

- Does staff wash hands before patient contacts?



### **Standard Precautions for Facility Personnel (Cont.)**

- Does staff wear gloves when in contact with blood and body fluids?
- Does staff change gloves between tasks and wash hands after removing gloves?
- Does staff practice hand hygiene after contact with blood and body fluids?
- Does staff protect eyes when splash of body fluids is possible?
- Does staff gown when body fluids may splash on personal clothing?
- Does staff dispose of single service medical equipment used in care of MRSA infected inmates in biohazard bags?
- Does staff reassign inmates with poor personal hygiene to other assignments?
- Are inmates with skin disease isolated until etiology is defined?
- Are inmates with MRSA skin disease assigned to cells with other infected inmates?

## APPENDIX C

### MRSA Control and Prevention Questionnaire Key

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#### Control Measure: Screening

- A** Does staff perform an interview on newly incarcerated inmates from the community?
- B** Does staff perform a physical examination on newly incarcerated inmates from the community?
- C** Does staff perform an interview on newly incarcerated inmates from other correctional facilities?
- D** Does staff perform a physical examination on newly incarcerated inmates from other correctional facilities?
- E** Does staff perform an interview on inmates complaining of skin lesions?
- F** Does staff perform a physical examination on inmates complaining of skin lesions?
- G** Does staff perform an interview on inmates exposed to a MRSA infected individual?
- H** Does staff perform a physical examination on inmates exposed to a MRSA infected individual?

#### Control Measure: Treatment

- I** Does staff apply warm soaks and compresses to skin infection daily until infection clears?
- J** Does staff incise and drain skin lesions when needed?
- K** Are dressings changed daily by a healthcare worker?
- L** Is antibiotic therapy only used as an addition to drainage and care of an infected site?

## **Treatment (Cont.)**

- M** Does staff use only antibiotics that are recommended for MRSA?
- N** Does staff culture wounds to identify the cause of the infection?
- O** Is antibiotic therapy adjusted after results of antibiotic susceptibility are available?
- P** When skin lesions still appear infected, are patients re-evaluated for continuation of antibiotic use, drainage of lesion and possible nasal decolonization?
- Q** Are patients monitored for side affects and proper use of antibiotics?

## **Control Measure: Personal Hygiene**

- R** Does staff encourage daily showering of inmates with soap and water?
- S** Does staff allow inmates access to antibiotic soap for hand washing?
- T** Are hand washing sinks readily accessible for inmates and staff?
- U** Are alcohol based hand sanitizers available during an outbreak?

## **Control Measure: Environmental Control**

- V** Does staff regularly clean medical equipment used for the care of MRSA infected inmates?
- W** Does staff properly dispose of single service medical equipment used in the care of MRSA infected inmates?
- X** Does staff properly dispose of dressings?
- Y** Is an approved detergent sanitizer used for daily cleaning?
- Z** Does staff identify and regularly clean areas exposed to sweat? Ex: Exercise Bench

## **Environmental Control (Cont.)**

- AA** Is hot water over 160 F for 25 minutes used to properly wash laundry?
- BB** Is laundry completely dried before removing from dryer?

## **Control Measure: Education**

- CC** Are inmates educated regarding avoiding touching lesions, drainage or dressings of another infected inmate?
- DD** Are inmates educated regarding washing hands after contacting an infected inmate?
- EE** Are inmates educated regarding avoiding the sharing of personal items?
- FF** Is work specific training performed for laundry personnel?
- GG** Is work specific training performed for healthcare personnel?
- HH** Is work specific training performed for kitchen workers?
- II** Is work specific training performed for housekeeping?

## **Control Measure: Standard Precautions for Facility Personnel**

- JJ** Does staff wash hands before patient contacts?
- KK** Does staff wear gloves when in contact with blood and body fluids?
- LL** Does staff change gloves between tasks and wash hands after removing gloves?
- MM** Does staff practice hand hygiene after contact with blood and body fluids?
- NN** Does staff protect eyes when splash of body fluids is possible?
- OO** Does staff gown when body fluids may splash on personal clothing?
- PP** Does staff dispose of single service medical equipment used in care of

MRSA infected inmates in biohazard bags?

**Standard Precautions for Facility Personnel (Cont.)**

- RR** Does staff reassign inmates with poor personal hygiene to other assignments?
- SS** Are inmates with skin disease isolated until etiology is defined?
- TT** Are inmates with MRSA skin disease assigned to cells with other infected inmates?

## **APPENDIX D**

### **PUBLIC HEALTH COMPETENCIES**

I wish to thank Wright State University for the opportunity to develop and refine my public health competencies through this Applied Research Project. I have already been able to apply my knowledge and experience from this project towards a leading public health issue in 2007. The following public health competencies have either been developed or refined through the application of this research project:

#### **Domain #1 Analytical Assessment Skills**

1. Identify relevant and appropriate data and information sources.
2. Determine uses and limitations of both qualitative and quantitative data.
3. Evaluate the integrity and comparability of data and identify gaps in data sources
4. Partner with communities to attach meaning to collected, quantitative and qualitative data.
5. Obtain and interpret information regarding risks and benefits to the community.
6. Apply data collection processes, information technology applications and computer systems storage retrieval strategies.

#### **Domain #2 Policy Development of Program Planning Skills**

7. Collect, summarize and interpret information pertaining to an issue.

### **Domain #3 Communication Skills.**

8. Communicate effectively both in writing and orally, or in other ways.
9. Use media, advanced technologies, and community networks to communicate information.
10. Solicit information from individuals and organizations.
11. Effectively present accurate, demographic, statistical programmatic and scientific information for professional and lay audiences.

### **Domain #5 Community dimensions of Practice Skills**

12. Collaborate with community partners to promote the health of the population.
13. Establish and maintain linkages with key stakeholders.

### **Domain #6 Basic Public Health Science Skills**

14. Identify the individuals and organizations responsible within the context of the essential public health services and core functions.
15. Identify and apply basic research methods used in public health.
16. Identify and retrieve current relevant scientific evidence.
17. Identify the limitations of research and the importance of observations and inter relationships.

### **Domain #8 Leadership and Systems Skills**

18. Promote team and organizational learning.

## APPENDIX E



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**DATE:** March 15, 2007

**TO:** Jeffrey A. Webb, P.I., Student  
Public Health  
Tom Murphy, M.D., MPH, Fac. Adv.  
Pediatrics

**FROM:** Robyn Wilks, CIM, Coordinator  
WSU Institutional Review Board

**SUBJECT:** SC#3319  
*'MRSA Control and Prevention in Correctional Facilities'*

The above human subjects study was approved by the Screening Committee on the condition that you respond to the Committee's comments. **Please note that the activities covered by this action may ONLY be initiated when all restrictions have been received and accepted.**

In order for us to remove the conditions, would you please respond by sending a cover letter explaining the additions or changes along with a copy of any revised pages and/or consent document (with changes highlighted) as indicated.

Send your response to Robyn Wilks, Coordinator, Institutional Review Board, 201J University Hall. If you have any questions concerning the condition(s), please contact me at 775-2425.

Thank you!

Enclosures