

## **MRSA**

### **159**

#### The Impact of Contact Precautions on Patient Satisfaction

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#### Background

Many hospitals use patient contact isolation (PCI) to decrease transmission of resistant organisms. The effect of PCI on patient satisfaction with hospital care is unknown.

#### Objective

To compare patient satisfaction with hospital care between patients on PCI and those not on PCI, and 2. To assess isolated patients' understanding of PCI practices and rationale.

#### Methods

A cross sectional study was performed. One trained interviewer orally administered a questionnaire to cases (PCI patients) and controls (non-PCI patients) on the inpatient medical and surgical services at the Hospital of the University of Pennsylvania between 8/7/06 and 8/25/06. Controls were matched (1:1) to cases by hospital floor and service. Patients in ICUs were excluded. The questionnaire was based on the CAHPS Hospital Survey (a well-validated patient satisfaction assessment tool), and was expanded to include questions relating specifically to PCI.

#### Results

43 cases and 43 controls were interviewed. 23 case-control pairs were on surgical services and 20 were on medical services. Compared to controls, cases were more likely to have been in the ICU during the present admission (46.5% v 23.3%;  $p = 0.049$ ) and had longer hospitalizations prior to the interview (median length of stay [IQR] = 10 [5-18] v 6 [3-9];  $p=0.005$ ). Cases were less satisfied with certain aspects of nursing and physician care, were less likely to recommend the hospital to others and reported a lower overall rating of the hospital. These differences were not statistically significant after controlling for length of stay prior to interview. 39 cases (91%) answered additional PCI-related questions specific to objective #2. Seventeen (46%) reported that PCI was explained to them by healthcare personnel during the present hospitalization, 28 (72%) correctly described proper use of PCI (gowns and gloves) and 32 (82%) agreed that PCI protects others from infection. However, 24 (62%) thought that one goal of PCI is to protect themselves from becoming infected, and 22 (56%) reported that immunosuppression was a reason for PCI. Twenty-two (56%) reported that PCI improved the care they received while 3 (8%) reported that PCI worsened their care. Patients reported that nurses usually or always abided by PCI more often than physicians (95% [ $n=36$ ] vs. 74% [ $n=28$ ];  $p=0.02$ ).

#### Conclusions

PCI does not appear to be independently associated with lower patient satisfaction with inpatient hospital care. PCI is frequently not explained to patients on PCI. Most PCI patients understand that PCI is in place for the benefit of others and to decrease infection transmission, but many believe that PCI is for their own protection against infection.

### **160**

#### Hospital-wide Decrease in Methicillin-Resistant *Staphylococcus aureus* (MRSA) During a Sustained Prevention Program

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### Background

In fiscal year 2002, the Veteran's Affairs Pittsburgh Medical Center (158 acute care beds) initiated an MRSA prevention program consisting of active surveillance for MRSA, Contact Precautions, hand hygiene, and systems/culture change strategies to improve infection control adherence.

### Objective

To describe hospital-wide incidence of MRSA and methicillin-susceptible *S. aureus* (MSSA) during a phased MRSA intervention.

### Methods

The intervention was introduced by unit in three phases: Phase I (initiated 10/1/2001), a 36 bed non-ICU surgical unit that accounted for 20% of total hospital patient-days (pt-days); Phase II (initiated 10/1/2003), extended the intervention to an 11-bed surgical ICU that accounted for an additional 9% of total pt-days; Phase III (initiated 7/1/2005), extended the intervention to all remaining acute care units (100% of pt-days). We calculated the hospital-wide incidence of clinical MRSA and MSSA isolates from 10/1/1999 to 6/30/2006. An incident case was defined by a patient with a newly identified clinical isolate of MRSA or MSSA from a clinical culture obtained >48 hours following admission (provided that the patient had no clinical isolates for the respective organism in the preceding 12 months). Results of surveillance cultures were excluded from the analysis.

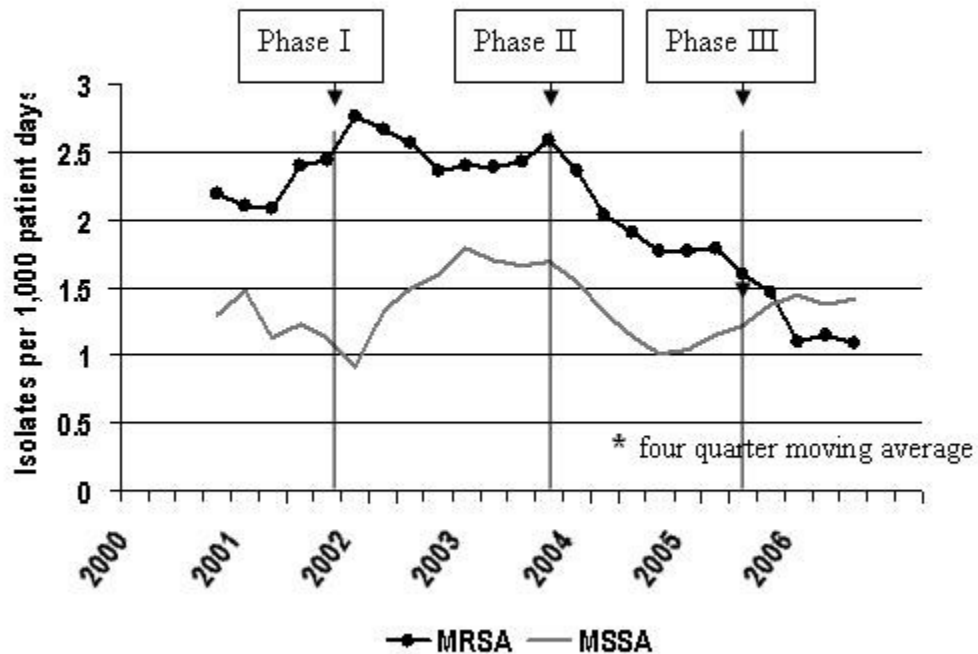
### Results

The incidence of MRSA decreased from 2.31/1,000 pt-days during the two-year pre-intervention period to 1.40 during the final two years of the intervention (39% reduction,  $P < .001$ ) (figure). There was no change in the pre- and post-intervention incidence of MSSA (1.22 vs 1.37/1,000 pt-days,  $P = 0.49$ ). The proportion of incident *S. aureus* resistant to methicillin decreased from 63% in the first pre-intervention year to 44% in the final intervention year ( $P = 0.005$  for trend). The number of clinical cultures per 1,000 pt-days was unchanged over the course of the study period (50.3 pre-, 49.8 post-intervention,  $P = 0.31$ ).

### Conclusions

The incidence of MRSA and the proportion of incident *S. aureus* isolates resistant to methicillin decreased significantly during a sustained, phased, MRSA prevention program.

### Hospital-wide Incidence\* of Clinical *S. aureus* Isolates, Veteran's Affairs Medical Center, Pittsburgh, FY2000-2006



161

Transmission Rates During a Sustained Methicillin-resistant Staphylococcus Aureus (MRSA) Prevention Program in a Non-intensive Care Unit (ICU)

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#### Background

MRSA transmission rates have not been well characterized outside of ICUs. Starting in fiscal year 2002, the Veteran's Affairs Pittsburgh Medical Center initiated a MRSA intervention in a 36-bed, non-ICU, surgical patient care unit consisting of active surveillance for MRSA, Contact Precautions, hand hygiene, and systems/culture change strategies to improve adherence.

#### Objective

To describe MRSA and methicillin-susceptible *S. aureus* (MSSA) admission prevalence and transmission during a MRSA intervention.

#### Methods

From 2001 through 2006, admission and discharge nasal swabs for *S. aureus* were obtained from all patients admitted to the unit. Admission prevalence was defined as the proportion of

patients with an admission swab who had *S. aureus* isolated from surveillance or clinical cultures obtained  $\leq 48$  hrs of admission. Transmission was defined by isolation of *S. aureus* from either a clinical or surveillance culture obtained  $>48$  hrs after admission from a patient who had a negative admission surveillance culture, a length of stay (LOS)  $\geq 96$  hours, and who had a discharge surveillance culture performed  $\leq 48$  hours from discharge/transfer from the unit.

### Results

Of 9935 admissions during the study period, 8268 (83.2%) had admission surveillance cultures performed. Overall admission prevalence of MRSA was 808/8268 (9.8%), decreasing from 11.3% to 8.9% during the study period ( $P = .04$  for trend). Of those who had admission surveillance cultures performed, 2042 (24.7%) had LOS  $\geq 96$  hrs, MRSA-negative admission cultures, and a discharge culture performed. The overall MRSA transmission rate was 80/2042 (3.9%), decreasing from 5.7% to 2.3% during the study period ( $P = .08$  for trend after controlling for admission prevalence, figure). Overall admission prevalence of MSSA was 1803/8268 (21.8%), with no significant change during the study period. Of those who had admission swabs performed, 2230 (27.0%) had LOS  $\geq 96$  hrs, MSSA-negative admission swabs, and a discharge swab performed. The MSSA transmission rate was 59/2230 (2.6%), with no significant change during the study period.

### Conclusions

In a non-ICU setting the admission prevalence of MRSA carriage (9.8%) was similar to that reported in ICU settings. The MRSA transmission rate decreased by 60% over the course of the intervention, but there was no significant change in the MSSA transmission rate.

## 162

Are Community-Associated Methicillin-Resistant Staphylococcus aureus (CA-MRSA) Strains Replacing Traditional Nosocomial MRSA?

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### Background

Recent studies have suggested that CA-MRSA infections are encroaching upon nosocomial settings.

### Objective

To use phenotypic and genotypic analysis to describe the epidemiology of nosocomial CA-MRSA bloodstream infections (BSIs).

### Methods

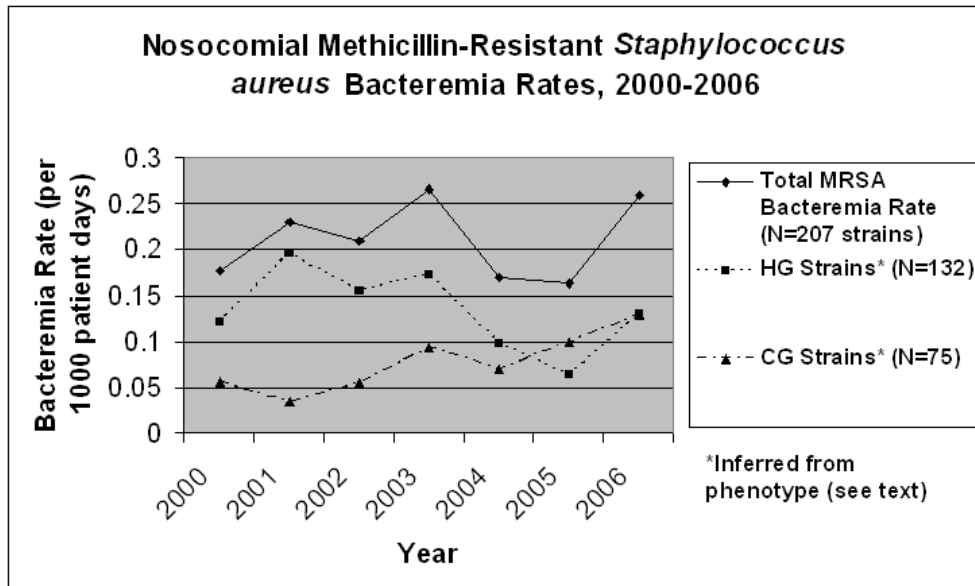
Using electronic data, we studied Stroger Hospital of Cook County patients with nosocomial BSIs (NSBSIs) (onset  $>72$  hours into admission) in 1/2000-12/2006. We did genotypic analysis (PFGE, PVL, and SCC*mec* typing) on isolates from 2004-2006. From the genotypes, a phenotypic rule was derived and applied to MRSA NSBSIs from 1/2000-12/2006. A nested case-control analysis was conducted on patients ( $n=130$ ) from 6/2002-12/2006 to compare demographics, risk factors, and outcomes of patients with CA strains that caused NSBSIs to patients with traditional nosocomial strains.

### Results

48 strains were used to create a rule to infer community genotype (CG) [USA 300 ( $n=20$ ), USA 400 ( $n=1$ )] or hospital genotype (HG) [USA 100 ( $n=19$ ), USA 500 ( $n=4$ ), USA 800 ( $n=4$ )]. Combined quinolone and clindamycin susceptibility was the best phenotypic predictor of CG [LR 4.3 (95% CI, 2.5-5.2)].

The 7/2003-12/2006 and 1/2000-6/2003 MRSA NSBSI case rates (0.207/1000 and 0.213/1000

patient days, respectively) were relatively stable [RR 1.0 (95% CI, 0.7-1.3)]. However, the risk for MRSA NSBSI due to a CG increased [RR 1.9 (95% CI, 1.2-3.1)] while the risk for an MRSA NSBSI due to a HG decreased [RR 0.7 (95% CI, 0.5-0.9)] (Figure).



In the case-control study, there were no significant differences between patients with CG and HG isolates for age, sex, race, illicit, Charlson score, diabetes, HIV, dialysis, prior MRSA, hospitalization, surgery, or long-term care in the prior year. Day of acquisition of positive blood culture did not predict strain type. Most outcomes (length of stay, intensive care, death, or readmission at 3 months) were similar for infections due to CG and HG; on univariate analysis, persistent bacteremia (7 days while on appropriate treatment) was associated with HG isolates ( $p=0.08$ ), though after adjustment for HIV, diabetes, prior surgery and hospitalization, this association did not persist.

#### Conclusion

CA-MRSA infections are increasing and encroaching upon nosocomial settings. While total MRSA NSBSI rates were relatively unchanged in 2000-2006, CG strains were responsible for an increasing proportion of cases (25% vs 49%, in first vs second half of the period), suggesting replacement of traditional hospital strains. For most risk factors and outcomes, patients with CG and HG isolates were similar. Our findings suggest that CGs are replacing HGs in nosocomial settings and are behaving like their traditional hospital counterparts.

#### 163

Methicillin-resistant *Staphylococcus aureus* (MRSA) and White Coats of Healthcare Workers

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#### Background:

MRSA is a prevalent nosocomial pathogen and an important infection control problem. Healthcare workers (HCWs) are recognized as being transient vectors for MRSA transmission and previous studies have suggested that this transmission may be associated with contaminated HCW clothing and equipment. Previous studies in Europe have suggested that 5-30% of HCWs' white coats may be contaminated with *S. aureus*, however no contamination with MRSA has been observed. To our knowledge, there have been no studies of MRSA contamination on HCW

white coats in the United States.

**Objective:**

To assess the prevalence of MRSA on the white coats of HCWs attending medical grand rounds.

**Methods:**

This study was conducted on a single day in November 2006 among attendees of medical grand rounds at a large teaching hospital in Baltimore, Maryland. Each HCW wearing a white coat was asked to participate. Participants completed a brief 8-item survey and swabbed their white coat around the lapels, cuffs, and hip pockets with a bacterial culture swab, according to investigators' instructions. Culture swabs were then evaluated for the presence *S. aureus* and MRSA using standard methods.

**Results:**

Overall, 109 grand rounds attendees participated in the study. Of these, there were 24 attending physicians, 11 fellows, 46 residents, 24 students, 1 nurse, 1 nurse practitioner, 1 pharmacist, and 1 physician's assistant. In these participants, 29 (27%) white coats were colonized with *S. aureus* and 6 white coats (6% of total, and 21% of those with SA) were colonized with MRSA. Questionnaire data revealed that 71 HCWs (65%) had washed their coats greater than 1 week ago, with 17 (15.6%) washing their coats greater than 4 weeks ago. Twenty-two HCWs (20%) perceived their coats as being very dirty, while 71 HCWs (65%) perceived their coats to be somewhat dirty. Eighty-four HCWs (78%) reported having seen a patient earlier on the day of the study.

**Conclusion:**

This study suggests that a large proportion of HCWs white coats may be contaminated with *S. aureus* and MRSA. These numbers mirror the trend of increasing prevalence of MRSA over *S. aureus* observed in both hospital and community settings. White coats worn by HCWs may be a source for patient-to-patient transmission of MRSA.

**164**

The Chart Project: Using Statistical Process Control Charts to control MRSA acquisitions

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**Background**

MRSA poses a significant problem for healthcare institutions across the world. Adoption of industrial quality improvement tools by infection control teams to this intractable problem has been advocated and merits detailed scientific investigation.

**Objectives**

To explore whether SPCs of ward-acquired MRSA (WA-MRSA) colonisation / infections feedback from ICNs to ward managers monthly would result in a decrease in incidence or an increase in rate stability and process consistency.

**Methods**

75 wards in 24 UK hospitals were randomly assigned to: SPC feedback alone; SPC feedback in conjunction with structured diagnostic tools, and control wards with no new or changed feedback. Monthly SPC feedback of WA-MRSAs commenced in March 2004 for 24 months. A concurrent descriptive component designed to explore the complex dynamics of decision-making and action

taken by healthcare workers was explored.

#### Results

The results showed a statistically significant sustained decrease in the WA-MRSAs in all three groups following initiation of feedback. The mean percentage change was 18.8% for control wards, 30.2% for the SPC only wards and 28% for the SPC and tools wards [ $p = 0.005$ ,  $<0.001$ ,  $0.015$ ], although there was no statistically significant difference between the control and intervention groups. However, there were significantly fewer 'out of control' episodes in the intervention groups ( $p = .021$ ), indicating more consistent infection control processes. The descriptive component provided valuable insight into the operational issues underpinning the feedback process.

#### Conclusions

SPCs of WA-MRSAs were found to be a useful, well-liked user-friendly tool to assist infection control teams in infection prevention and control locally at ward, institution and national level.