Preventing Healthcare-Associated Methicillin-Resistant Staphylococcus aureus Infections
Dr. William Jarvis, Jason and Jarvis Associates
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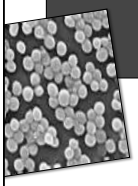

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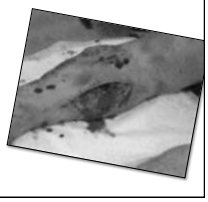

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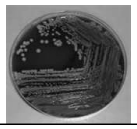
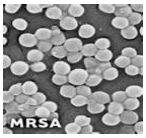
Objectives

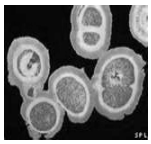
- Discuss the evidence-based methods to prevent and control MRSA-healthcare-associated infections (MRSA-HAIs);
- Examine the impact (e.g., cost, morbidity, and mortality) associated with MRSA-HAIs;
- Illustrate how healthcare facilities are controlling MRSA transmission; and
- Refute stated challenges and barriers to MRSA-HAI control.



SHEA MRSA Recommendations

- Muto CA. et al, ICHE 2003;24:362-386.
- Calfee D. et al, ICHE 2008;29:S62-80.





Rationale and Statements of Concern

- Increasing rates of hospital-acquired infections (HAI) caused by methicillin-resistant *Staphylococcus aureus* (MRSA) in acute-care facilities;
- In the U.S., the rate of methicillin resistance among hospital-associated *S. aureus* infections in intensive care unit (ICU) patients has steadily increased and approaches 60%; and
- MRSA has also been documented in other areas of the hospital and other types of healthcare facilities including those that provide long-term care.

Calfee D. et al, ICHE 2008;29:S62-80.

Outcomes Associated With MRSA-HAIs

- MRSA HAIs are associated with significant morbidity and mortality;
- Compared to patients with methicillin-susceptible *S. aureus* (MSSA) bacteremia, those with MRSA bacteremia have nearly twice the mortality rate, significantly longer hospital stays, and significantly increased median hospital costs;
- Compared to patients with an MSSA surgical site infection (SSI), those with an MRSA-SSI, have 3.4-times higher risk of death and almost two times greater median hospital costs;

Calfee D. et al, ICHE 2008;29:S62-80.

Risk of MRSA-HAI Among Colonized Patients

- A substantial proportion of colonized patients will subsequently develop an MRSA infection;
- One study of persons in whom MRSA colonization had been identified during a previous hospital stay reported that the risk of developing an MRSA infection, such as bacteremia, pneumonia, or soft tissue infection, within 18 months of detection of MRSA colonization was 29%.

Calfee D. et al, ICHE 2008;29:S62-80.

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Surveillance Definitions

- **Hospital-onset MRSA**: A patient's first MRSA isolate is classified as a new case of "hospital-onset MRSA" if it is identified from a specimen obtained after the third calendar day of hospitalization, with the day of admission being counted as calendar day number one.
- **Community-onset MRSA**: A patient's first MRSA isolate is classified as "community-onset" if it is identified from a specimen obtained on or before the third calendar day of a patient's hospitalization, with the day of admission being counted as calendar day number one.

Calfee D. et al, ICHE 2008;29:S62-80.

Methods for MRSA Surveillance—Routine Surveillance of Clinical Specimen

- The reservoir for transmission of MRSA is largely composed of the group of patients with clinical MRSA infection and the much larger group of patients who are merely colonized. Various surveillance methods can be used to identify one or both of these groups.
- **Routine surveillance of clinical specimens:** Clinically infected patients and some asymptomatically colonized patients are recognized when MRSA is isolated from a clinical specimen sent to the microbiology laboratory.
- A program to identify patients from whom MRSA has been isolated from a clinical specimen should be in place in all hospitals.
- A common surveillance strategy used by IC programs includes a daily review of laboratory culture results to identify patients from whom MRSA has been isolated.
- However, studies have shown that this method is not reliable for identifying asymptomatically colonized patients, potentially missing 85% of this group. Active surveillance testing can be useful in detecting this group of patients.

Calfee D. et al, ICHE 2008;29:S62-80.

Methods for MRSA Surveillance—Active Surveillance Testing

- Active surveillance testing for MRSA can be defined as performing diagnostic testing for the purpose of detecting asymptomatic MRSA colonization.
- Involves collection of superficial swab specimens from >1 common sites of MRSA colonization.
- Tests specimens for the presence of MRSA using bacterial culture techniques or other methodologies.
- Detects a large proportion of the MRSA-colonized persons within a hospital who otherwise would go undetected.
- Identifies patients who are already colonized at the time of admission so that subsequent MRSA isolates are not falsely attributed to intra-facility acquisition.
- May more accurately monitor MRSA transmission and effectiveness of prevention programs than monitoring of clinical specimens alone.
- May reduce the potential for unrecognized patient-to-patient transmission of MRSA when colonized patients are placed into contact precautions.
- Multiple published reports have shown an association between active surveillance testing and control of MRSA when such testing was included as part of a comprehensive MRSA prevention program.

Calfee D. et al, ICHE 2008;29:S62-80.

Recommendations for Implementing Prevention and Monitoring Strategies

- **Institute basic practices**
- Conduct an MRSA risk assessment
- Educate HCWs regarding MRSA
- Ensure compliance with hand hygiene recommendations
- Ensure proper disinfection with equipment and environment
- Ensure compliance with contact precautions for colonized and infected patients
- Implement an MRSA monitoring program
  - Implement an MRSA line-list
  - Implement a laboratory-based alert system so that new cases of MRSA are immediately identified by IC program
  - Implement an alert system that identifies readmitted or transferred MRSA- positive patients

Calfee D. et al, ICHE 2008;29:S62-80.

Recommendations for Implementing Prevention and Monitoring Strategies

- **Continue to monitor MRSA rates**
- Develop a regular reporting system to relevant stakeholders, physicians, nurses, staff, and other hospital leaders.
- Hold relevant individuals and groups accountable for implementing and complying with basic prevention measures.

Calfee D. et al, ICHE 2008;29:S62-80.

Recommendations for Implementing Prevention and Monitoring Strategies

- **If MRSA NOT effectively controlled**
- **Ensure compliance with basic practices**
- **Institute advanced practices**
  - **Conduct active surveillance for MRSA colonization among patients**
  - **Ensure compliance with active surveillance program**
- **Continue to monitor MRSA rates**
- **Continue MRSA reporting and accountability system**

Calfee D. et al, ICHE 2008;29:S62-80.

Recommendations for Implementing Prevention and Monitoring Strategies

- **If MRSA STILL NOT effectively controlled**
- Ensure compliance with advanced practices
- Assess need to intensify active surveillance testing program
- Consider additional control measures
  - Decolonization/eradication therapy
  - Active surveillance testing among HCW
- Continue to monitor MRSA rates
- Continue MRSA reporting and accountability system

Calfee D. et al, ICHE 2008;29:S62-80.

U.S. MRSA Hospitalizations

- From 2000-2005, MRSA hospitalizations increased from ~45/100,000 population to ~115/100,000 population (Zilberberg M et al. EID 2008;14:1756-8). 2.6 fold increase
- From 1999-2005, MRSA-related U.S. hospitalizations increased from 127,036 to 278,203 (Klein E et al. EID 2007;13:1840-6). 2-fold increase

Invasive MRSA Infections in the United States, 2005

- 8,987 cases of invasive MRSA (July 2004- December 2005).
- HA-MRSA: 7,639 (85%), CA-MRSA 1,234 (13.7%), 114 (1.3%) not classified.
  - HA-MRSA-community onset rate: 17.6 per 100,000.
  - HA-MRSA-hospital-onset rate: 8.9 per 100,000
  - Community-acquired-MRSA rate: 4.6 per 100,000 (interval estimate: 3.6-4.4).
- 5,287 invasive MRSA infections in 2005.
- When standardized for the U.S. population, it was estimated that in 2005:
- 94,360 patients had invasive MRSA infections
- 18,650 in-hospital deaths from invasive MRSA.

Klevens RM et al. JAMA 2007;298:1763-1771

Location-Specific Methicillin-Resistant *Staphylococcus aureus* (MRSA) Healthcare-Associated Infections (HAIs), Centers for Disease Control and Prevention's National Healthcare Safety Network (NHSN), 2009

- **Background:** The recent SHEA/HICPAC position paper recommends monitoring MRSA-HAIs by patient-care area, yet national data on all types of MRSA-HAIs by patient location have never been reported.
- **Objective:** Describe MRSA-HAIs reported from various patient-care locations in NHSN hospitals.
- **Methods:** Data on all MRSA-HAIs reported to the CDC's NHSN Multidrug-Resistant Organism (MDRO) and *Clostridium difficile*-Associated Disease (CDAD) Module from January-September 2009 were analyzed. An MRSA-HAI incidence rate (MRSA-HAIs /1,000 patient-days) was calculated for each facility-defined patient unit (unit-specific), and data were also summed across all units of the same type for a pooled mean MRSA-HAI incidence rate (location-specific).

Sievert DM et al., Abstract 520, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

Location-Specific Methicillin-Resistant *Staphylococcus aureus* (MRSA) Healthcare-Associated Infections (HAIs), Centers for Disease Control and Preventions, National Healthcare Safety Network (NHSN), 2009

Results:

- 403 facilities performed MRSA-HAI surveillance in ≥ 1 unit for ≥ 1 month.
- 197 (48.8%) reported no MRSA-HAIs.
- 206 facilities reported 915 MRSA-HAIs from 317 facility-defined patient units which mapped to 38 different location types.
- Most reporting facilities were general hospitals and 54% had ≤ 200 beds.
- Of all MRSA-HAIs reported,
  - 55% were among males.
  - Mean patient age was 58 (range: 0-102) years.

Sievert DM et al., Abstract 520, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

Table 1. Distributions and Pooled Mean Incidence Rates of MRSA HAIs Reported from Select Locations, NHSN MDRO and CDAD Module 2009

CDC Location	Number			HAI Type						HAI Rate*
	Facilities	Months	Infections	BSI	PNEU	SSI	SST	LRI	Other	
ICU:										
Surgical	21	122	63	11%	52%	19%	2%	10%	6%	1.13
Medical	46	248	93	26%	37%	2%	3%	24%	8%	0.74
Medical-Surgical	232	1429	186	22%	46%	9%	6%	9%	8%	0.37
Ward:										
Medical	31	217	101	17%	18%	1%	50%	1%	13%	0.59
Medical-Surgical	87	557	199	12%	5%	27%	40%	5%	11%	0.49
Surgical	17	113	53	17%	5%	51%	19%	2%	6%	0.46
Other:	91	974	220	23%	22%	18%	20%	8%	9%	0.43

Note: ICU, intensive care unit; BSI, bloodstream infections; PNEU, pneumonia; SSI, surgical site infections; SST, skin and soft tissue infections; LRI, lower respiratory tract infections.
* HAI Rate, pooled mean number of MRSA HAI / 1,000 patient-days.

Location-Specific Methicillin-Resistant *Staphylococcus aureus* (MRSA) Healthcare-Associated Infections (HAIs), Centers for Disease Control and Preventions, National Healthcare Safety Network (NHSN), 2009

Conclusions:

Bloodstream infections (BSIs) **represent a minority of the MRSA HAI** identified from the select locations evaluated. Hospital wards had MRSA infection incidence rates comparable to the ICUs. Focusing MRSA surveillance only on BSIs in ICUs overlooks a large proportion of the patient population at high risk for MRSA-HAI.

Sievert DM et al., Abstract 520, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

APIC U.S. Inpatient MRSA Prevalence Survey, October 2006

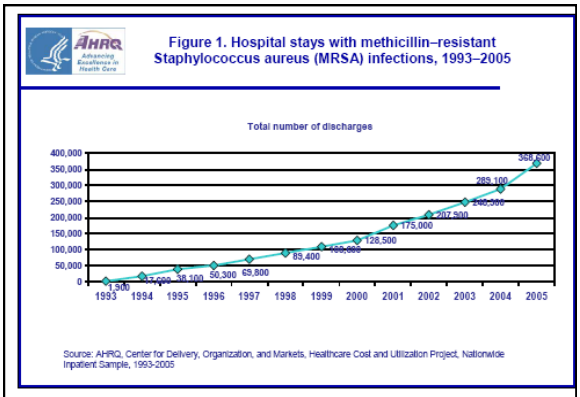
- 8,654 MRSA patients with colonization/infection.
- 187,058 inpatients
- Overall MRSA prevalence rate:

46.3 per 1,000 inpatients.

Jarvis WR et al. AJIC 2007;35:631-638.

The APIC National MRSA Inpatient Survey Results: HA-MRSA vs. CA-MRSA

***CA-MRSA = diagnosed <48 hours, skin/soft tissue infection, susceptible to clindamycin and Levofloxacin.**

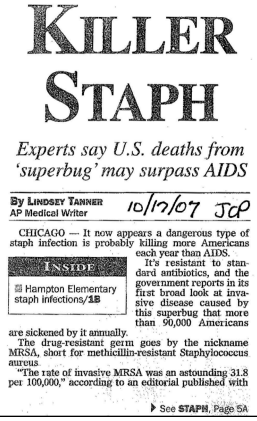


A. Elixhauser and C. Steiner. AHRQ Statistical Brief #35, July 2007

Seattle Times Investigative Report on MRSA

- Mike Berens and Ken Armstrong (November 2008)
- Methods: Reviewed available data (comprehensive state hospital records, death certificates, and other records) for the decade 1996-2006.
- Results: 2000 to 2006: MRSA infections increased from 815 to 4643 and deaths increased from 58 to 190 per year.
- During the decade, MRSA infection rates increased 33-fold;
- At least 23,707 documented MRSA infections and 1217 deaths.
- If each infection cost $20,000, Washington state has spent >$474 million on MRSA infections.

http://seattletimes.nwsource.com/html/localnews/2008396215_mrsaday1.html
http://seattletimes.nwsource.com/html/localnews/2008399313_mrsaday20.html
http://seattletimes.nwsource.com/html/localnews/2008403751_mrsaday3m0.html



KILLER STAPH

Experts say U.S. deaths from 'superbug' may surpass AIDS

By Lindsey Tanner
AP Medical Writer

10/17/07 JAP

CHICAGO — It now appears a dangerous type of staph infection is probably killing more Americans each year than AIDS.

It's resistant to standard antibiotics, and the government reports in its first broad look at invasive disease caused by this superbug that more than 90,000 Americans are sickened by it annually.

The drug-resistant germ goes by the nickname MRSA, short for methicillin-resistant Staphylococcus aureus.

"The rate of invasive MRSA was an astounding 31.8 per 100,000," according to an editorial published with

INSIDE
Hampton Elementary staph infections/1B

See STAPH, Page 5A

Invasive MRSA (mostly HA-MRSA and mostly BSI) kills nearly 19,000 patients annually in the United States.

Annual Numbers of Deaths (U.S.)

Cause	Number
MRSA (invasive)	~19,000
HIV/AIDS	~15,000
Parkinson's	19,544
Homicides	18,124
Injuries at work	5,113
Infant mortality	9,070

MRSA Colonization Leads to Infection

- Nares cultures on all patients admitted to five units.
- 30/758 (3.96%) patients MRSA-colonized on admission.
- 19% of those MRSA-colonized on admission and 25% of those acquiring MRSA in the hospital developed MRSA infections compared to 1.5% of those MSSA-colonized or 2% of those not colonized.
- MRSA-colonization increased infection risk compared to MSSA-colonization (RR=9.5) or un-colonized (RR=12).
- Identifying MRSA-colonized patients at admission may benefit from interventions to decrease infection.

Davis et al CID 2004;39:776-782.

Strain-relatedness of MRSA Isolates Recovered From Patients With Repeated Infection

- Study design: Assessed genetic relatedness of isolates obtained ≥2wks apart representing infections or colonization-infection sets.
- Results/conclusion:
  - MRSA infection following initial colonization or infection is caused by the same strain.
  - A single successful decolonization may prevent the majority of later infections.

Huang SS et., CID 2008;46:1241-7.

Risk of MRSA Infection and Death in Long-term MRSA Carriers

- Study design: Follow-up of 281 prevalent (>1 yr) MRSA carriers.
- Results:
  - 65/281 developed 96 discrete and unrelated MRSA infections within 1 year.
    - Pneumonia 39%
    - Soft tissue 14%
    - CVC-infections 14%
    - BSI 24%
  - 38 MRSA infections occurred during new hospital admissions. 32 (84%) were the reason for the admission.
  - 14 deaths occurred; 22% of MRSA infections and 5% of colonized patients.

Datta R et al., CID 2008;47:176-81.

Can't You Just Rely On Clinical Cultures To Detect MRSA-Patients?

- Muder et al. showed that in a VA Hospital Surgical Unit from November 2001-August 2002, when they performed AST (cultures) on all admitted patients, only 33/91 (36%) with MRSA-positive cultures would have been detected by clinical cultures. (Muder et al, SHEA Annual Meeting 2004).
- Salgado et al. found that of 437 patients MRSA-colonized on hospital admission, only 66 (15%) had positive clinical cultures for MRSA during their hospital stay. (Infect Control Hosp Epidemiol. 2006;27:116-21).
- Muto et al found that only 26% (118/459) of the 459 patients identified as MRSA-colonized via AST had a MRSA + clinical culture; ¾ of all patients would have been missed if AST were not in place. (Muto et al, SHEA Annual Meeting 2005).

SHEA Guideline Recommendations-Five Steps to Controlling Antibiotic Resistant Pathogens: Active Detection and Isolation (ADI)

1. Risk assessment to identify high risk patients.
2. Active surveillance testing of identified high-risk populations to identify the reservoir for spread.
3. Hand hygiene.
4. Barrier precautions for patients known or suspected to be colonized or infected with epidemiologically important antimicrobial-resistant pathogens, such as MRSA or VRE.
5. Antibiotic Stewardship.
6. Decolonization or suppression of colonized patients.

Muto CA. et al, ICHE 2003;24:362-386.

MRSA Prevention-Guideline Comparison

	IHI	CDC	SHEA	APIC
Guideline Title	5 Million Lives Campaign: Reduce MRSA Infections, December 2006	Management of MDROs in Healthcare Settings, November 2006	Guideline for Preventing Nosocomial Tx of Multidrug-Resistant Strains of *S. aureus* and Enterococcus, 2003	Implementation guide to best practices for the Elimination of MRSA Tx, March 2007
Active Surv Testing	*Essential Intervention Recommended*	*by all Guidelines*	*for prevention and control of*	*MRSA-associated infections*
When to conduct	Routinely; on admission; periodic/weekly sweeps of high-risk areas and high-risk patients	When MDRO rates are Not going down. Routinely; on admission; periodic/weekly sweeps of high-risk areas and high-risk pts. Monitor for trends	Routinely; on admission; periodic/weekly sweeps of high-risk areas and high-risk patients	Routinely; on admission; periodic/weekly sweeps of high-risk areas and high-risk patients

Adapted from document provided by Amber Hogan, BD; www.BD.com/HAIs

MRSA Prevention-Guideline Comparison

	IHI	CDC	SHEA	APIC
AST of which patients?	*High-risk patients upon admission and weekly – each hospital to determine risk factors.*	*including: - prior history of MRSA - admission to ICU*	*recent hospitalization (< one year) – roommates of colonized or infected Persons*	*history or transfer from long-term care facility - skin wounds*
Which sites To test/ culture for MRSA?	Anterior nares will identify majority of colonized adults; adding wound cultures Increases sensitivity. Anterior nares and umbilicus for Newborns.	Anterior nares usually Sufficient. Obtain cultures from areas of skin breakdown and draining wounds.	Anterior vestibule of the nose –always; throat cultures can enhance sensitivity; Consider peri-rectal perineal, but never as only culture Site areas of skin breakdown.	Anterior nares Areas of skin breakdown and wounds.

Adapted from document provided by Amber Hogan, BD; www.BD.com/HAIs

MRSA Prevention-Guideline Comparison

	IHI	CDC	SHEA	APIC
Contact precautions including hand hygiene	*Per CDC/HICPAC Guidelines.* Routinely For all patients known to Be colonized or infected with MRSA. If single rooms are not available For patient isolation, MRSA-colonized or infected patients can be cohorted together.	*Per CDC/ HICPAC Guidelines*	*Per CDC/ HICPAC Guidelines*	*Per CDC/ HICPAC Guidelines*
Environmental measures including surface and equipment Decontam	*Essential*	*element*	*recommended*	*by all.*
Antibiotic stewardship	*Essential*	*element*	*recommended*	*by all.*

Adapted from document provided by Amber Hogan, BD; www.BD.com/HAIs

Recommendations For Preventing MRSA Transmission-Active Detection and Isolation (ADI)

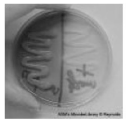
- Conduct a risk assessment.
- Active surveillance testing to identify MRSA-colonize patients.
- Isolation (cohorting) of colonized and infected patients.
- Hand hygiene—before/after patient/ environment contact.
- Gown and glove, if patient or contaminated environmental contact anticipated.
- Routine environmental cleaning.

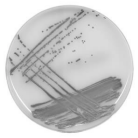
Selective Media

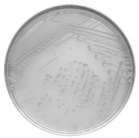
- First step towards improved turn-around time for microbiologic information in the laboratory
- Agars that have additives:
  - Antimicrobials
  - Reaction dyes that lead to color change
  - Initially read at 18 - 24 hours
- Based on phenotypic and biologic characteristics of the organism.
- ~ equal sensitivity to non-selective growth methods.
- Examples: Mannitol salt agar, chromogenic agars, CCFA (cycloserine-cefoxitin-fructose agar), *Clostridium difficile* Selective Agar (CDSA), etc.

Culture Screening Methods

- Mannitol salt agar (with or without oxacillin)
- MRSA medium (Oxoid)
- MRSA *Select* (BioRad)
- CHROMagar MRSA
  - BD Diagnostics
  - M-Tech Diagnostics
- MRSA-ID (BioMerieux)

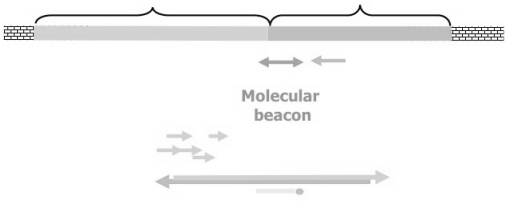






Rapid Molecular Diagnostics

- Molecular detection technology
  - Based on genetic characteristics
  - Using technology that amplifies the DNA and then uses probes to label the results of the amplification



Surveillance Methods for Detection of MRSA Colonization

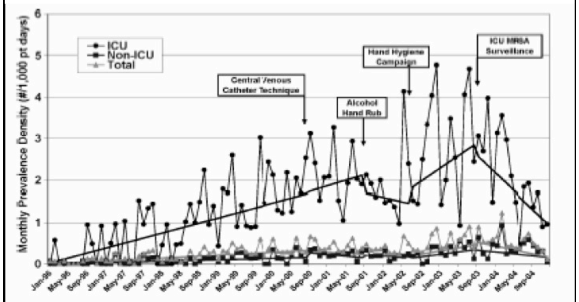
	Traditional culture	Combined culture plus rapid testing	Rapid molecular testing
Optimal turn-around times (hrs)	48 – 72	24	~ 2 - 6
Isolate available	Yes	Yes	No
Details		Chromogenic agars, polymerase chain reaction (PCR) from oxacillin-enhanced broth, PCR from culture, latex agglutination	Immuno-capture plus real-time PCR, real-time PCR

Controlling Endemic MRSA

- Study Design: Retrospective study of 4 major infection control interventions—promoting compliance with: 1) maximum barrier precautions; 2) institution of alcohol-based hand rubs for hand disinfection; 3) hand hygiene campaign; and 4) institution of routine nares cultures for MRSA in all ICU patients on admission and weekly thereafter (+ cult contact isolation). Four years. Eight ICUs.
- Analysis: Interrupted time series.

Huang SS. et al. CID 2006:43:971-978

Reducing MRSA-BSI Rates



Impact of ICU Surveillance on Nosocomial MRSA Bacteria January 1996 – December 2004

75% reduction in MRSA bacteremia

Controlling Endemic MRSA

- **Results**: In 16 months of active surveillance cultures for MRSA, the incidence density of MRSA-BSI decreased by 75% in the ICUs (P=.007) and by 40% in non-ICUs (P=.008), leading to a 67% hospital-wide reduction in the incidence of MRSA-BSI (P=.002). MSSA rates remained stable. The other interventions were not associated with a statistically significant change in MRSA-BSIs.
- **Conclusion**: Routine surveillance for MRSA in ICUs allowed earlier initiation of contact isolation precautions and was associated with a large and statistically significant reduction in MRSA-BSI in the ICUs and hospital-wide. No similar decrease was attributable to the other infection control interventions—including hand hygiene and contact isolation.

Huang SS. et al. CID 2006:43:971-978

Comparison of Routine Culture vs. PCR for MRSA Control

- Study site: 9 bed medical/surgical ICU, England.
- Study period: April 2005-February 2006
- Intervention: Routine culture (April-August 2005). PCR (September 2005-February 2006). Standard infection control measures implemented for MRSA+.

Method	# Patients	Time to Result	MRSA Incidence Rate*	Odds Ratio	95% CI
Routine Culture	612	3 days	13.9		
PCR	693	1 day	4.9	0.65	0.28-1.07

*Mean rate per 1000 patient-days. Cunningham et al. JHI 2007;65:24-28

Does True Universal MRSA Screening Reduce Transmission and MRSA Infections?

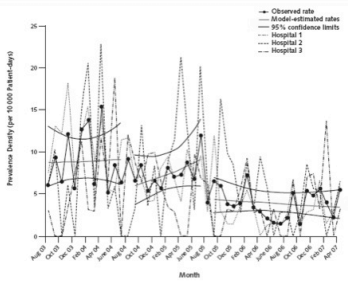
Study Design: Observational, prospective interventional study with **universal screening** using MRSA-PCR on all admissions to three hospitals (total: 850 beds and 40,000 admissions per year) in Evanston, Ill.

- **Compared**: Passive surveillance (clinical detection-12m); Targeted surveillance cultures (clinical culture + high risk = ICU-12m); or Universal patient screening--21m.
- August 2005 to September 1, 2006.
- **Intervention**: Nasal screening. MRSA+ contact isolation, topical decolonization (mupricin).
- Poisson and segmented regression models used to compare prevalence density. Robicsek et al. Annals Intern Med 2008;148:409-418

~ 70% reduction in MRSA-HAIs

Robicsek et al., Annals Intern Med 2008

Figure 3. **Segmented Poisson regression model: aggregate hospital-associated methicillin-resistant *Staphylococcus aureus* prevalence density throughout the study time frame.**



On average: 16 hour TAT from collection to result

Impact of a 4-Year Universal Surveillance and Decolonization Program to Control Methicillin-Resistant *Staphylococcus aureus* (MRSA)

- **Objective:** To expand the data available on the effect of universal surveillance, with contact isolation and decolonization of positive patients.
- **Study design:** Observational study in a 3-hospital, 850-bed system with 40,000 annual admissions comparing MRSA clinical disease rates during and 30 days after hospital admission. Intervention using a real-time PCR-based nasal MRSA surveillance followed by topical decolonization and contact isolation of MRSA-positive patients. The evaluation involved 3 consecutive periods: baseline (1 year), MRSA surveillance for all ICU admissions (ICU; 1 year), and universal MRSA surveillance for all hospital admissions (4 years). After showing no autocorrelation, aggregate hospital-associated MRSA rates were compared using a segmented Poisson regression model. Chi square test was used for other statistical comparisons.

Peterson LR et al., Abstract 73, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

Impact of a 4-Year Universal Surveillance and Decolonization Program to Control Methicillin-Resistant *Staphylococcus aureus* (MRSA)

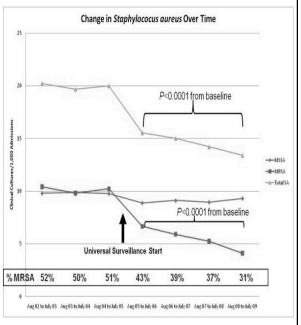
The rate of total clinical *S. aureus* (20.2 to 13.4/1,000 admissions) and MRSA (10.4 to 4.1/1,000 admissions) ($P \leq 0.001$), but MSSA did not change.

The prevalence density of aggregate hospital-associated MRSA disease (all body sites) at baseline, during ICU surveillance, and during universal surveillance was 8.9, 7.4 ($P = 0.15$ compared with baseline), and 3.3 ($P \leq 0.001$ compared with baseline and ICU surveillance), respectively.

The prevalence density of MRSA infection at each body site decreased.

The percentage of exogenous MRSA fell from 48.1% to 33.3%.

This intervention was estimated to reduce healthcare infection cost by almost $9 million and prevented 72 deaths.



Peterson LR et al., Abstract 73, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

Impact of a 4-Year Universal Surveillance and Decolonization Program to Control Methicillin-Resistant Staphylococcus aureus (MRSA)

Conclusions:

The introduction of universal admission surveillance for MRSA was associated with a large and progressive reduction in MRSA disease during admission and 30 days after discharge that was sustained for 4 years. It also reduced total *S. aureus* infections due to reduction in MRSA disease, global healthcare cost, and mortality.

Peterson LR et al., Abstract 73, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

The Veteran's Hospital Administration (VHA) MRSA Control Program

- The national initiative focuses on implementing the VHA MRSA Bundle which consists of four essential elements (ADI):
- Active Surveillance Testing [AST](Admission/Transfer/Discharge Swabbing)
- Hand Hygiene
- Contact Precautions
- Cultural Transformation (Leadership and Staff Engagement)
- Consistent use of the VHA MRSA Bundle had been shown to markedly reduce MRSA-related infections in the pilot facilities.
- Phase I: The VHA system began doing universal patient testing in 2006 at its approximately 150 hospitals in ICU patients.
- Phase II of the initiative began in March 2007 and was a national roll-out including all VHA medical facilities with all patients (ICU and non-ICU).
- MRSA prevalence on admission ranged from 5% to 22% (clinical culture 1-1.5%; AST 9%-12%).

VHA MRSA Control Program Results

Year	FY06	FY07	FY08	FY09
ICU-MRSA-HAI Rate*	1.37	1.36	1.20^	0.79^
Non-ICU MRSA Rate			0.54	0.378#

MRSA-CVC-BSI rate: 0.4 to 0.18 per 1000 CVC-days: P=0.02

MRSA VAP rate: 10.0 to 7.9 per 1000 Ventilator-days: P=0.009

In March 2009, the VA expanded the MRSA control program to their long-term care facilities nationwide.

*Rate per 1,000 bed-days 07 vs. 08: P=0.04; 08 vs. 09: P<0.001;
p=0.02

Preventing Healthcare-Associated Methicillin-Resistant Staphylococcus aureus Infections
Dr. William Jarvis, Jason and Jarvis Associates
Sponsored by Virox Technologies Inc. www.virox.com

Results of a Veterans Affairs Initiative to Prevent Healthcare-Associated Methicillin-Resistant Staphylococcus aureus Infections

- **Objective:** To reduce MRSA HAIs in acute care VA hospitals.
- **Methods:** An "MRSA bundle" was implemented in all 153 acute care VA medical centers nationwide. The bundle consisted of: 1) nasal surveillance testing for MRSA on all admissions, in-hospital transfers, and discharges, 2) contact precautions for MRSA-positive patients, 3) hand-hygiene, and 4) a culture change where infection control became everyone's responsibility. Personnel at each center entered aggregate data on surveillance compliance, MRSA prevalence, healthcare-associated MRSA transmissions, and HAIs each month into a central database. Data from October 2007 to June 2009 included here.

Evans ME et al. Abstract 74, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

Results of The Veterans Affairs Initiative to Prevent Healthcare-Associated Methicillin-Resistant *Staphylococcus aureus* (MRSA) Infections

- **Results:**
  - 1,213,646 admissions and transfers (230,470 to intensive care units (ICUs) and 983,176 to non-ICUs) and 5,296,757 bed-days of care (846,570 ICU and 4,450,187 non-ICU).
  - Admission screening increased from 82% to 92%; transfer/discharge screening increased from 71% to 92%.
  - The mean (±SD) admission MRSA prevalence was 13.2 ± 4.9% (facility mean range 5.2% to 29.1%).
  - In-hospital MRSA transmission rates fell 23% in the non-ICU ($P = 0.01$, linear regression) and 32% in the ICU ($P = 0.004$) setting.
  - HAI rates declined 24% in the non-ICU setting ($P = 0.04$), including declines in bloodstream infections (BSIs; 58%), pneumonias (43%), urinary tract infections (UTIs; 30%), and skin and soft-tissue infections (SSTIs; 26%). HAI rates in ICUs did not change in the two years before full implementation of the MRSA bundle ($P = 0.69$ for trend), but declined 77% ($P < 0.001$) with the MRSA bundle. During the intervention period, the following decreased: MRSA-VAPs (53%), CLA-BSIs (44%), non-device related MRSA-BSIs (58%), pneumonias (67%), UTIs (79%), and SSTIs (32%).
- **Conclusions:** A program of universal surveillance, contact precautions, hand hygiene, and culture change was associated with a decrease in MRSA in-hospital transmissions and HAIs.

Evans ME et al. Abstract 74, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

Hand Hygiene Noncompliance and the Cost of Hospital-Acquired MRSA Infection

- **Background**. Hand hygiene noncompliance is a major cause of nosocomial infection, but the effect of hand hygiene noncompliance is unknown.
- **Objective**. To estimate MRSA-related cost of an incident of hand hygiene noncompliance by a healthcare worker (HCW) during patient care.
- **Design**. Two models were created to simulate sequential patient contacts by a hand hygiene-noncompliant HCW. Model 1 involved encounters with patients of unknown MRSA status. Model 2 involved an encounter with an MRSA-colonized patient followed by an encounter with a patient of unknown MRSA status. A simulation of 10^6 noncompliant events was performed. Total costs of resulting infections were aggregated and amortized over all events. Setting. Duke University Medical Center, a 750-bed tertiary medical center in Durham, North Carolina.

Cummings KL et al., Infect Control Hosp Epidemiol. 2010 Feb 25.

Hand Hygiene Noncompliance and the Cost of Hospital-Acquired MRSA Infection

Results

Model	MRSA Infections (#, rate)	Infection Cost (mean, 95%CI)	Noncompliant event cost (mean, 95%CI)
1	42 (0.0042%)	$47,092 ($26,040-68,146)	$1.98 ($0.91-3.04)
2	980 (0.098%)	$53,598 ($50,098-57,097)	$52.53 ($47.73-57.32)

- A 200-bed hospital incurs $1,779,283 in annual MRSA infection-related expenses attributable to hand hygiene noncompliance.
- A 1.0% increase in hand hygiene compliance resulted in annual savings of $39,650 to a 200-bed hospital.

- **Conclusions**. Hand hygiene noncompliance is associated with significant attributable hospital costs. Minimal improvements in compliance lead to substantial savings.

Cummings KL et al., Infect Control Hosp Epidemiol. 2010 Feb 25.

Assessing the role of undetected colonization and isolation precautions in reducing Methicillin-Resistant *Staphylococcus aureus* transmission in intensive care units.

- **BACKGROUND**: Screening and isolation are central components of hospital MRSA control policies. Prevention of patient-to-patient spread depends on minimizing undetected/unisolated MRSA-positive patient-days.
- **METHODS**: Colonization data from admission and weekly nares cultures were collected from eight single-bed adult ICUs over 17 months. Detected MRSA-positive patients were isolated using single rooms and barrier precautions. Data were analyzed using stochastic transmission models and model fitting was performed within a Bayesian framework using a Markov chain Monte Carlo algorithm.
- **RESULTS**: Models estimated the mean percent of MRSA-colonized-patient-days attributed to undetected carriers as 14.1% (95% CI: 11.7, 16.5). The percent of colonized-patient-days attributed to patients awaiting results averaged 7.8% (6.2, 9.2). Overall, the ratio of estimated transmission rates from unisolated MRSA-positive patients and those under barrier precautions was 1.34 (0.45, 3.97), but varied widely across ICUs.
- **CONCLUSIONS**: Screening consistently detected >80% of colonized-patient-days. Estimates of the effectiveness of barrier precautions showed considerable uncertainty, but in all units except burns/general surgery and one cardiac surgery ICU, the best estimates were consistent with reductions in transmission associated with barrier precautions.

Kypraios T et al., BMC Infect Dis. 2010;10:29.

Is Pre-Operative MRSA Screening of Surgical Patients Cost Effective?

- **Study design**: Budget impact model using 2003 U.S. Nationwide Inpatient Sampling data.
- **Results**: 7,181,484 patients admitted to hospitals for elective surgery.
  - Pre-admission testing and subsequent decolonization therapy for patients colonized with *S. aureus* would result in:
    a) A mean annual cost savings to U.S. hospitals of $231,538,400 (95%CI -$300 million to $1.3 billion);
    b) A mean of 364,919 days of hospitalization avoided (95% CI: 67,893-926,983 days); and
    c) A mean of 935 in-hospital deaths avoided per year.
  - Sensitivity analysis indicate a 64.5% probability that there would be cost savings to U.S. hospitals adopting this approach.
- **Discussion**: The addition of pre-admission testing and decolonization therapy to standard care would result in significant cost savings, even after the accounting for variations in the model inputs.

Noskin G et al. ICHE 2008;29:16-24

Preventing MRSA Infections in Surgical Patients: "Universal Screening"

- **Study design**: Observational cohort study. Cardiac surgery patients, SW England. Period 1: October 2004-September 2005: no screening Period 2: October 2005-September 2006: MRSA-PCR; if MRSA+, then nasal mupiricin and topical triclosan for 5 days.
- **Results**: Period 1: 695 patients. Period 2: 1462 patients.
  - SSI rate decreased from 3.3% to 2.2%
  - MRSA infection rate decreased: Relative risk 0.77, 95% CI: 0.56-0.95.
- **Discussion**: MRSA screening and decolonization of MRSA + patients reduced cardiac surgery overall surgical and MRSA infection rates.

Jog S et al. J Hosp Infect 2008;69:124-30.

Universal surveillance by PCR for *S. aureus* followed by decolonization

- Randomized trial
  - PCR identification of *S. aureus* in patients admitted to the hospital.
  - Decolonization with nasal mupirocin and chlorhexidine bathes.

Kluytmans et al. ICAAC 2008, Abstract #: K-1711

	mupirocin and chlorhexidine (n=504)	placebo (n=413)	RR (95% CI)
primary outcome			
nosocomial S. aureus infections – no (%)	17 (3.4)	32 (7.7)	0.42 (0.23-0.75)
source of S. aureus infection – no (%)			
endogenous	12 (2.4)	25 (6.1)	0.39 (0.20-0.77)
exogenous	4 (0.8)	6 (1.5)	0.55 (0.16-1.92)
unknown	1 (0.2)	1 (0.2)	
localization of S. aureus infection – no (%)			
surgical site (deep)*	4 (0.9)	16 (4.4)	0.21 (0.07-0.62)
surgical site (superficial)*	7 (1.6)	13 (3.5)	0.45 (0.18-1.11)
lower respiratory tract	2 (0.4)	2 (0.5)	0.82 (0.12-5.78)
urinary tract	1 (0.2)	0 (0)	
bacteremia	1 (0.2)	1 (0.3)	
soft tissue	2 (0.4)	0 (0)	

* calculated for surgical patients only. Number of surgical patients: n=441 in mupirocin/chlorhexidine group, n=367 in placebo group

Kluytmans et al, ICAAC 2008, Abstract #: K-1711

Preventing Surgical-Site Infections in Nasal Carriers of *Staphylococcus aureus*

- **Background:** Nasal carriers of *Staphylococcus aureus* are at increased risk for healthcare–associated infections with this organism. Decolonization of nasal and extranasal sites on hospital admission may reduce this risk.
- **Methods:** A randomized, double-blind, placebo-controlled, multicenter trial at 3 university and 2 general hospitals in Holland from October 2005 through June 2007 assessing whether rapid identification of *S. aureus* nasal carriers by real-time polymerase-chain-reaction (PCR) assay, followed by treatment with mupirocin nasal ointment and chlorhexidine soap, reduces the risk of hospital-associated *S. aureus* infection.

Bode LGM et al., N Engl J Med 2010;362:9-17.

Preventing Surgical-Site Infections in Nasal Carriers of *Staphylococcus aureus*

- **Results:** Of 6771 patients screened on admission, 1270 nasal swabs from 1251 (18.5%) patients were *S. aureus*-positive.
  - 917 patients enrolled in the intention-to-treat analysis, of whom 808 (88.1%) underwent a surgical procedure.
  - All the *S. aureus* strains identified on PCR assay were susceptible to methicillin and mupirocin.
  - The rate of *S. aureus* infection was 3.4% (17/504 patients) in the mupirocin–chlorhexidine group vs.7.7% (32/413 patients) in the placebo group (RR, 0.42; 95% CI, 0.23 to 0.75).
  - The effect of mupirocin–chlorhexidine treatment was most pronounced for deep surgical-site infections (RR, 0.21; 95% CI, 0.07 to 0.62).
  - The time to the onset of nosocomial infection was shorter in the placebo group than in the mupirocin–chlorhexidine group (P = 0.005).

Bode LGM et al., N Engl J Med 2010;362:9-17.

Preventing Surgical-Site Infections in Nasal Carriers of *Staphylococcus aureus*

Table 1. **Baseline Characteristics of the 917 Study Patients.**

Characteristic	Mupirocin–Chlorhexidine (N=504)	Placebo (N=413)	P Value
Mean (±SD) age — yr	61.8±13.9	62.8±13.3	0.25
Male sex — no. (%)	331 (65.7)	251 (60.8)	0.13
Hospital service — no. (%)			
Surgery	441 (87.5)	367 (88.9)	0.53
Internal medicine	63 (12.5)	46 (11.1)	0.53
Admission during month before current admission — no./total no. (%)	86/503 (17.1)	67/411 (16.3)	0.76
McCabe score at admission*			
Median	1	1	
Interquartile range	1–2	1–2	
Underlying disorder — no./total no. (%)			
Diabetes mellitus type 1 or 2	112/503 (22.3)	71/412 (17.2)	0.06
Disorder requiring continuous ambulatory peritoneal dialysis	7/504 (1.4)	4/413 (1.0)	0.57
Renal insufficiency	24/504 (4.8)	23/413 (5.6)	0.57
Immunodeficiency†	19/504 (3.8)	31/413 (7.5)	0.01
Liver-function disorder	25/504 (5.0)	22/413 (5.3)	0.80
Malignant condition	63/504 (12.5)	46/413 (11.2)	0.54
Skin disease	52/501 (10.4)	58/408 (14.2)	0.08
Antibiotic therapy — no./total no. (%)			
At time of admission	17/504 (3.4)	16/413 (3.9)	0.69
During month before admission	41/500 (8.2)	28/408 (6.9)	0.46

* We used the McCabe score, as modified by Doern et al.,[18] to classify the severity of the underlying disease as follows: 1, nonfatal; 2, possibly fatal; 3, ultimately fatal; and 4, rapidly fatal.
† Details concerning the definition of immunodeficiency are available in the Methods section of the Supplementary Appendix.

Preventing Healthcare-Associated Methicillin-Resistant Staphylococcus aureus Infections
Dr. William Jarvis, Jason and Jarvis Associates
Sponsored by Virox Technologies Inc. www.virox.com

Preventing Surgical-Site Infections in Nasal Carriers of *Staphylococcus aureus*

Table 2. Relative Risk of Hospital-Acquired *Staphylococcus aureus* Infection and Characteristics of Infections (Intention-to-Treat Analysis).

Variable	Mupirocin–Chlorhexidine (N=504)	Placebo (N=413)	Relative Risk (95% CI)*
	no. (%)		
S. aureus infection	17 (3.4)	32 (7.7)	0.42 (0.23–0.75)
Source of infection†			
Endogenous	12 (2.4)	25 (6.1)	0.39 (0.20–0.77)
Exogenous	4 (0.8)	6 (1.5)	0.55 (0.16–1.92)
Unknown	1 (0.2)	1 (0.2)	
Localization of infection			
Deep surgical site†	4 (0.9)	16 (4.4)	0.21 (0.07–0.62)
Superficial surgical site†	7 (1.6)	13 (3.5)	0.45 (0.18–1.11)
Lower respiratory tract	2 (0.4)	2 (0.5)	0.82 (0.12–5.78)
Urinary tract	1 (0.2)	0	
Bacteremia	1 (0.2)	1 (0.2)	
Soft tissue	2 (0.4)	0	

* Relative risks are for *S. aureus* infection in the mupirocin–chlorhexidine group.
† The source of the *S. aureus* infections was determined by comparing nasal strains with strains isolated from the infection site by pulsed-field gel electrophoresis.
‡ Data are for surgical patients only: 441 in the mupirocin–chlorhexidine group and 367 in the placebo group.

Bode LGM et al., N Engl J Med 2010;362:9-17.

Preventing Surgical-Site Infections in Nasal Carriers of *Staphylococcus aureus*

Conclusions:

The number of surgical-site *S. aureus* infections acquired in the hospital can be reduced by rapid screening and decolonizing of nasal carriers of *S. aureus* on admission.

Bode LGM et al., N Engl J Med 2010;362:9-17.

Should Universal Surveillance for Methicillin-Resistant Staphylococcus aureus (MRSA) Be Performed in Neonatal Units?

- **Background:** Newborns may be particularly susceptible to MRSA colonization, infections, and severe complications because of their underdeveloped immune systems. Performing universal MRSA surveillance of inpatient newborns and placing colonized neonates on contact precautions is one potential method of preventing transmission. The economic value of this strategy is not established.
- **Objective:** To determine the potential economic impact of performing universal MRSA surveillance of inpatient newborns.
  Methods: Use of a stochastic computer simulation model to determine the potential economic impact of performing universal MRSA surveillance for all inpatient newborns at different MRSA prevalence and reproductive rate (R0) thresholds. Newborns who tested positive for MRSA were placed on contact precautions. MRSA carriers not placed on contact precautions could transmit MRSA to R0 other neonates. Each new case then entered into a newborn MRSA clinical outcomes model accruing costs and utilities.
  Results: Each simulation run involved sending 1,000 simulated newborns through the model 1,000 times (i.e., 1,000,000 trials). Performing surveillance was cost-effective [incremental cost-effectiveness ratio (ICER) < $50,000 per quality-adjusted life year (QALY)] at R0≥0.25 and prevalence ≥ 0.05. In fact, surveillance was the dominant strategy, (i.e. less costly and more clinically effective compared to no surveillance), when R0 ≥3.0 and prevalence ≥ 0.40.
- **Conclusions:** At a wide range of MRSA prevalence and R0 values, universal MRSA surveillance of inpatient newborns appears to be cost-effective.

Bailey RR, et al., Abstract 509, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

Clinical and economic impact of methicillin-resistant *Staphylococcus aureus* (MRSA) colonization or infection on neonates in intensive care units (NICU)

- **OBJECTIVE**: To determine the clinical and economic impact of MRSA colonization or infection on infants and to measure excess mortality, length of stay, and hospital charges attributable to MRSA.
- **METHODS**: A retrospective cohort study of infants admitted to a level III-IV NICU in Washington, DC from September 2004-March 2008. A time-dependent proportional hazard model was used to analyze the association between MRSA colonization or infection and mortality. The relationships between MRSA colonization or infection and length of stay and between MRSA colonization or infection and hospital charges were assessed using a matched cohort study design.
- **RESULTS**: Of 2,280 infants, 191 (8.4%) had MRSA colonization or infection. Of 132 MRSA isolates with antibiotic susceptibility results, 106 (80%) were resistant to clindamycin and/or trimethoprim-sulfamethoxazole (i.e., non-community phenotype). The mortality rate was 17.8% for MRSA-colonized/infected patients and 11.5% for controls. Neither MRSA colonization nor infection was associated with increased mortality risk. Infection caused by MRSA strains that were resistant to clindamycin and/or trimethoprim-sulfamethoxazole increased the mortality risk by 40%, compared with the mortality risk of control subjects. **MRSA infection independently increased length of stay by 40 days (95% CI, 34.2-45.6) and was associated with an extra charge of $164,301 (95% CI, $158,712-$169,889; P < .001).**
- **CONCLUSIONS**: MRSA colonization or infection in infants is associated with significant morbidity and financial burden but is not independently associated with increased mortality.

Song X. et al, Infect Control Hosp Epidemiol. 2010;31:177-82.

Universal Neonatal Intensive Care Unit (NICU) Patient MRSA Screening Results in Sustainable Eradication of Hospital-Associated MRSA

- **Background:** Rates of invasive MRSA infections in neonates have increased and have resulted in significant morbidity and mortality. Pre-term and low birth-weight infants colonized with MRSA are at increased risk of invasive MRSA disease.
- **Objective:** To determine if routine MRSA screening for all NICU admissions would result in a sustainable decrease in hospital-associated MRSA infections.
- **Methods:** MRSA screening was instituted in February 2007 at Chidren's Hospital, Aurora, Colorado on all admissions to the NICU (exceptions: a) known MRSA-positive, b) negative for MRSA on a screen in the prior month, or c) admitted for <24 hours). All patients tested for MRSA were initially placed on contact precautions pending MRSA results. Initial MRSA testing with chromogenic agar provided results within 48 hours. Real-time PCR testing initiated in December 2008 with results available within 4-6 hours. The unit received monthly rates of MRSA screening compliance, hospital-associated MRSA events (colonization and/or infection), and percent of patients that tested positive for MRSA upon admission. Serial or discharge screening for MRSA was not performed.

Dolan SA et al., Abstract 548, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

Universal Neonatal Intensive Care Unit (NICU) Patient MRSA Screening Results in Sustainable Eradication of Hospital-Associated MRSA

- **Results:** Before the intervention (August 2006-January 2007), there were 0.94 MRSA events/1000 patient days. After universal MRSA screening, the rate significantly decreased to 0.24 MRSA events/1000 patient days (February 2007-October 2009). Compliance with admission screening was >99%; 2% of neonates were MRSA-positive on admission. Since April 2008 (18 months), there have been no new hospital-associated MRSA events.
- **Conclusions:** Hospital-associated NICU MRSA events dramatically decreased after initiation of universal MRSA screening. This study supports the validity of universal MRSA screening in a low MRSA prevalence NICU and does not support the need for additional serial or discharge screening for MRSA to result in a sustainable decrease in hospital-associated MRSA events.

Dolan SA et al., Abstract 548, *Fifth Decennial Conference, Atlanta, GA March 18-22, 2010.*

Joint Commission 2009 National Patient Safety Goal

NPSG.07.03.01

Implement evidence-based practices to prevent health care associated infections due to multiple drug-resistant organisms in acute care hospitals.
Note 1: This requirement applies to, but is not limited to, epidemiologically important organisms such as methicillin-resistant Staphylococcus aureus (MRSA), Clostridium difficile (CDI), vancomycin-resistant Enterococci (VRE), and multiple drug-resistant gram negative bacteria.
Note 2: This requirement has a one-year phase-in period that includes defined expectations for planning, development, and testing (milestones) at three, six, and nine months in 2009, with the expectation of full implementation by January 1, 2010.

Elements of Performance for NPSG.07.03.01

1	As of April 1, 2009, the hospital's leadership has assigned responsibility for oversight and coordination of the development, testing, and implementation of NPSG.07.03.01.
2	As of July 1, 2009, an implementation work plan is in place that identifies adequate resources, assigned accountabilities, and a time line for full implementation of NPSG.07.03.01 by January 1, 2010.
3	As of October 1, 2009, pilot testing in at least one clinical unit is under way, for the requirements in NPSG.07.03.01.
4	As of January 1, 2010, the elements of performance in NPSG.07.03.01 are fully implemented across the hospital.
5	As of January 1, 2010: Conduct periodic risk assessments for multi-drug resistant organism acquisition and transmission. (See also IC.01.03.01, EPs 1-5)
6	As of January 1, 2010: Based on the results of the risk assessment, the hospital educates staff and licensed independent practitioners about health care associated infections, multi-drug resistant organisms, and prevention strategies at hire and annually thereafter. Note: The education provided recognizes the diverse roles of staff and licensed independent practitioners and is consistent with their roles within the hospital. (See also HR.01.05.03, EP 4)
7	As of January 1, 2010: The hospital educates patients, and their families as needed, who are infected or colonized with a multi-drug resistant organism about health care associated infection strategies.

Reasons Given For Not Performing MRSA Screening

- MRSA bundle—don't know the impact of the various intervention components.
- Screening (high-risk or universal) that dramatically reduced MRSA infection rates were just "regression to the mean".
- Negative impact of contact isolation.
- AST alone not useful.
- Concluding that "screening for MRSA reduces MRSA infections---is not necessarily correct".
- Costs too much, too much work, laboratory burden, ignores all other HAIs, etc., etc., etc.

How Active Resisters and Organizational Constipators Affect Healthcare-associated Infection (HAI) Prevention Efforts?

- **Study question:** Why is translation of HAI prevention interventions so difficult?
- **Study design**: In-depth phone and in-person interviews with 86 participants (31 MDs) including CEOs, Chiefs of Staff, hospital epidemiologists, IPs, ICU directors, nurse managers, and frontline physicians and nurses.
- **Results**: Active resistance to evidence-based change was pervasive. Effective methods to overcome active resistors include benchmarking, identifying champions, and participating in collaborative efforts. Organizational constipators, mid to high level executives who act as insidious barriers to change—and increased difficulty of implementing change, need to be identified, included in early change discussions, obtaining buy-in, working around the individual and terminating resistor and organization constipator employment.

Saint S et al., Jt Comm J Qual Patient Saf 2009;35:239-46

Conclusion

- The epidemiology of *S. aureus* continues to change.
- U.S. population *S. aureus* colonization rates are similar to those described in the 1950s.
- MRSA colonization rates of the U.S. population remain low (<2%), but vary widely by location.
- MRSA now account for >60% of the *S. aureus* isolates causing healthcare-associated infections.
- Active interventions to control the transmission of HA-MRSA using ADI have been successful.
- Rapid MRSA detection systems result in quicker isolation of patients and reduces the risk of MRSA transmission.
- To prevent and control MRSA
  - For CO-MRSA-hygiene.
  - For HA-MRSA-ADI.
- If we in infection control do not lead the effort to prevent and control MRSA, private activists and politicians will legislate it.

Thank you!

The Next Few Teleclasses

18 Mar. 10	(Novice Teleclass) How to Prepare for CIC Certification Without Becoming Certifiable Speaker: Susan Cooper, Southeastern Ontario Infection Control Network
23 Mar. 10	(Free Teleclass) Voices of CHICA Speaker: Directors & Guests of the Community & Hospital Infection Control Association of Canada
25 Mar. 10	(Novice Teleclass) Infections in the Elderly Speaker: Christine Nutty, Infection Advice Inc.
01 Apr. 10	Microbial Control of Electronic Medical Equipment Speaker: Dr. Charles John Palenik, Indiana University School of Dentistry
08 Apr. 10	Simple Precautions – Simplifying Infection Control Speaker: Dr. Jim Hutchinson, Health Care Corporation of St. John's
13 Apr. 10	(Free Teleclass) Improvement in Healthcare Settings Around the World and the "SAVE LIVES: Clean Your Hands" Initiative Speaker: Claire Kilpatrick, World Health Organization

www.webbertraining.com.schedulep1.php