Healthcare-associated Infection Prevention Care Bundles: Preventing the Preventable

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Disclosure

Consultant to:
Bard, BD, J&J, Kimberly-Clark, Medscape, Xenex, APIC, and CDC
Purpose

• Discuss the evidence-base for healthcare-associated infection (HAI) prevention measures.
• Discuss how combining HAI prevention measures into care bundles is having a major impact on HAI prevention.
• Illustrate how applying current infection prevention and control measures together with proper use of medical technology can markedly reduce these adverse patient events.
• Illustrate how we are entering a new era in infection control—Zero tolerance for HAIs.
Urinary Tract Infections (UTIs)
Background

• Urinary tract infections (UTIs) often are the most common site of HAI.

• Most UTIs (80%) are associated with urinary catheterization.

• Approximately 25% of inpatients are catheterized.

• Attack rate: 2.0-3.1 UTIs per 100 admissions.
UTI Prevention Rule: Make Sure the Patient Really Needs the Catheter

**Appropriate indications**

- Bladder outlet obstruction
- Incontinence and sacral wound
- Urine output monitored
- Patient’s request (end-of-life)
- During or just after surgery

(Wong and Hooton - CDC 1983)

(Jain, Arch Int Med 1995)
Why are Catheters Used Inappropriately?

• Perhaps physicians “forget” that their patient has a urinary catheter.

• Study to determine the extent to which physicians are aware which of their inpatients have urinary catheters.

• Surveyed 56 medical teams at 4 sites; 256 providers completed the survey (response rate = 89%)

# Urethral Catheters: Lost in Place?

<table>
<thead>
<tr>
<th>Training Level</th>
<th>Proportion Unaware</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Student</td>
<td>18%</td>
<td>8-32%</td>
</tr>
<tr>
<td>Intern</td>
<td>22%</td>
<td>13-34%</td>
</tr>
<tr>
<td>Resident</td>
<td>28%</td>
<td>20-38%</td>
</tr>
<tr>
<td>Attending</td>
<td>38%</td>
<td>26-45%</td>
</tr>
</tbody>
</table>

**URINARY CATHETER REMINDER**

Date:  __ __ / __ __ / __ __

This patient has had an indwelling urethral catheter since __ __ / __ __ / __ __.

Please indicate below EITHER (1) that the catheter should be removed OR (2) that the catheter should be retained. If the catheter should be retained, please state **ALL** of the reasons that apply.

☐ Please **discontinue** indwelling urethral catheter; OR

☐ Please **continue** indwelling urethral catheter because patient requires indwelling catheterization for the following reasons (please check **all** that apply):

☐ Urinary retention

☐ Very close monitoring of urine output and patient unable to use urinal or bedpan

☐ Open wound in sacral or perineal area and patient has urinary incontinence

☐ Patient too ill or fatigued to use any other type of urinary collection strategy

☐ Patient had recent surgery

☐ Management of urinary incontinence on patient’s request

☐ Other - please specify: ____________________________________________________

_________________________________________  _______________________
   Physician’s Signature                     Doctor Number
National Survey of UTI Prevention Practices

- **Study design:** Survey of non-federal hospitals with ICUs and >50 beds (N=600) and VA hospitals (N=119).

- **Results:** Response rate = 72%.

<table>
<thead>
<tr>
<th>Practice</th>
<th>Per Cent Implementing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor who is catheterized</td>
<td>44%</td>
</tr>
<tr>
<td>Monitor catheter duration</td>
<td>36%</td>
</tr>
<tr>
<td>Use antimicrobial/antiseptic catheters</td>
<td>30%</td>
</tr>
<tr>
<td>Use condom catheters</td>
<td>14%</td>
</tr>
<tr>
<td>Use catheter reminders</td>
<td>9%</td>
</tr>
<tr>
<td>Non-fed vs. fed use antiseptic catheters</td>
<td>(30% vs. 14%; P=0.001)</td>
</tr>
</tbody>
</table>

Silver Catheters: What Is The Evidence Base?

To date, 11 comparative studies of and two meta-analyses of silver (the majority being the silver alloy urinary catheter) vs. non-coated Foley catheters have been conducted.

In every comparative trial, the number of CA-UTIs has been decreased in the impregnated silver-coated catheter group compared to the non-coated catheter group.

In some of these studies, the number of patients included has been small and thus a statistical significant decrease in CA-UTIs has not been documented (insufficient power). Nevertheless, in every study, a decrease in the rate of CA-UTI or CA-bacteruria has been documented.

In both meta-analyses, combining a variety of studies to increase the power to detect a difference in efficacy of silver-coated catheters, the authors have concluded that the silver-alloy coated catheter is associated with a significant reduction in CA-UTI and CA-bacteruria.

These data strongly support that silver alloy hydrogel impregnated urinary catheters can decrease the risk of CA-UTI or CA-bacteruria compared to non-coated catheters in patients who are to be catheterized for 3-7 days.
## Meta-Analysis of CA-UTI Prevention-Silver Alloy Catheters

**01.03 Number with symptomatic bacteriuria (Urinary tract infection)**

- **Review**: Types of urethral catheters for management of short-term voiding problems in hospitalised adults
- **Comparison**: 01 Antiseptic Catheter versus Standard Catheter
- **Outcome**: 03 Number with symptomatic bacteriuria (Urinary tract infection)

<table>
<thead>
<tr>
<th>Study</th>
<th>Silver alloy</th>
<th>Standard</th>
<th>Relative Risk (Fixed)</th>
<th>Weight (%)</th>
<th>Relative Risk (Fixed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td>95% CI</td>
<td></td>
<td>95% CI</td>
</tr>
<tr>
<td>01 Silver alloy versus standard</td>
<td>3/30</td>
<td>25/60</td>
<td>-</td>
<td>7.7</td>
<td>0.24 [0.08, 0.73]</td>
</tr>
<tr>
<td>Liedberg 1990a</td>
<td>6/60</td>
<td>22/60</td>
<td>-</td>
<td>10.1</td>
<td>0.27 [0.12, 0.62]</td>
</tr>
<tr>
<td>Liedberg 1990b</td>
<td>5/51</td>
<td>17/51</td>
<td>-</td>
<td>7.8</td>
<td>0.35 [0.15, 0.82]</td>
</tr>
<tr>
<td>Lundeberg 1988</td>
<td>64/407</td>
<td>94/443</td>
<td>-</td>
<td>41.4</td>
<td>0.74 [0.59, 0.99]</td>
</tr>
<tr>
<td>Maki 1998</td>
<td>9/60</td>
<td>13/109</td>
<td>-</td>
<td>5.4</td>
<td>0.84 [0.68, 1.07]</td>
</tr>
<tr>
<td>Thibon 2000</td>
<td>9/120</td>
<td>8/15</td>
<td>-</td>
<td>3.3</td>
<td>0.94 [0.45, 1.98]</td>
</tr>
<tr>
<td>Verheyen 1999a</td>
<td>20/70</td>
<td>60/101</td>
<td>-</td>
<td>24.2</td>
<td>0.60 [0.40, 0.94]</td>
</tr>
<tr>
<td>Verheyen 1999b</td>
<td>20/729</td>
<td>239/839</td>
<td>-</td>
<td>100.0</td>
<td>0.60 [0.50, 0.73]</td>
</tr>
</tbody>
</table>

- **Subtotal (95% CI)**: 122/729 vs 239/839
- **Test for heterogeneity**: chi-square=11.71 df=6 p=0.0688
- **Test for overall effect**: x2=5.22 p<0.00001

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CA-UTI Prevention Bundle

- Use urethral catheters only when necessary.
- Catheter inserters should be educated and competent.
- Use aseptic technique for catheter insertion and manipulation.
- Use a closed drainage system.
- Consider using an administrative catheter “stop order” to remind clinicians and possibly limit inappropriate catheterization.
- Consider silver catheters in high-risk patients who require catheterization for 2-10 days.

PREVENTION POSSIBILITY: 20%-70%
Ventilator-associated Pneumonia
Ventilator-associated Pneumonia (VAP) Background

- VAP is the most common healthcare-associated infection in critical care patients.
- Risk factors for VAP include age, chronic obstructive lung disease, trauma, gastric aspiration, duration ventilation, elevated gastric pH, etc.
- 10-20% of patients ventilated for >48 hrs will develop VAP.
Impact of VAP

- Attributable extra ICU stay of 22 days.
- ICU patients developing VAP are twice as likely to die.
- Crude mortality rate 60%.
- Attributable mortality 27%-43%.
- Attributable cost $15,986

Measures to Prevent VAP

• Prevent aerodigestive tract colonization:
  – Avoid unnecessary antimicrobials and stress ulcer prophylaxis
  – Use sucralfate for stress ulcer prophylaxis
  – CHG oral rinse
  – Selective gut decontamination
  – Short-course parenteral prophylactic antimicrobials in high-risk patients.

• Prevent aspiration of contaminated secretions:
  – Preferred oral intubation
  – Appropriate ICU staffing
  – Avoid tracheal intubation with use of mask ventilation
  – Application of weaning protocols and optimal use of sedation to shorten the duration of mechanical ventilation
  – Semi-recumbent positioning
  – Minimize gastric distension
  – Subglottic suctioning (sterile water)
  – Avoidance of ventilator circuit changes/manipulation (closed system)
  – Routine drainage of ventilator circuit condensate.

Ventilator Management Changes—The Bundle.

- Chlorhexadine on the unit
- Oral care product
- Sedation reduction vs. Sedation vacation
- Using deep vein thrombosis (DVT) and peptic ulcer disease (PUD) prophylaxis prevent risk for vent patients
- Using ventilator weaning protocol
- Continuous aspiration of subglottic secretions
**VENTILATOR BUNDLE COMPLIANCE AUDIT TOOL**

Nursing Audit for patient’s requiring mechanical ventilation

*Directions:* Please complete the following audit on any patient who has required Mechanical Ventilation for 24 hours or longer.

<table>
<thead>
<tr>
<th>PATIENT NAME/INFORMATION (ADDRESSOGRAPH)</th>
<th>DATE</th>
<th>HOB ≥ 30 DEGREES</th>
<th>DVT PROPHYLAXIS</th>
<th>PUD PROPHYLAXIS</th>
<th>DAILY SEDATION INTERRUPTIONS</th>
<th>DAILY ASSESSMENT OF READINESS TO EXTUBATE</th>
<th>OVERALL CRITERIA MET (Please check if YES)</th>
<th>COMMENTS</th>
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</table>
Oral Decontamination with CHG

- **Koeman M et al.** (AJRCCM 2006;173:1348-55): Randomized double blind placebo controlled trial (RCT): placebo vs. 2% CHG vs. 2% CHG/2% Colistin (CHG/COL) in patients ventilated for >48 hours. **Results:** The risk of VAP was decreased 65% with CHG (p=0.012) and decreased 55% for CHG/COL (p=0.003).

- **Tantipong H et al.** (ICHE 2008;29:131-6): RCT (2%CHG vs. Saline, 4 times per day). **Results:** VAP rate: CHG: 7 vs. Saline 21; p=.04.

- **Sona CS et al.** (JICM 2009;24:54-62): Pre- vs. Post-intervention observational study. Intervention: cleansing teeth with sodium monofluorophosphate paste and brush, rinse with water, then application of 0.12% CHG solution twice daily. **Results:** Pre-intervention: VAP rate per 1,000 vent-days: 5.2 vs. 2.4 in intervention period; p=0.04.
Data Feedback – New Way
Vent Bundle Compliance and VAP Infection Rates, Hospital A

% of Patients Compliant

Vent Bundle Compliance
Vent Bundle Goal=95%
VAP Infections/1000 Device Days

Manager verifies HOB at 30 degrees
Implemented Multidisciplinary Rounds
Spread vent bundle to 6E/8E ICU
Central Line Bundle Implemented

Daily audits; Sedation interruption protocol algorythm/orders in pt room
Rapid Response Team Implemented

One patient, one MD, one time
Data Feedback – New Way
Vent Bundle Compliance and VAP Infection Rates, Hospital A
Using a Bundle Approach to Improve Ventilator Care Processes and Reduce Ventilator-Associated Pneumonia

- **Study design**: Prospective intervention using the VAP Bundle at 61 healthcare organizations from July 2002-January 2004.

- **Results**: 35 units consistently collected data on VAP bundle compliance and VAP rates. **An average of 45% reduction in VAP was observed.**

Decreasing Ventilator-Associated Pneumonia in a Trauma Intensive Care Unit

- **Study design**: Prospective intervention. Pre-intervention VAP rates at the CDC’s NNIS 90th percentile (22.3-32.7 VAP per 1000 ventilator-days). VAP bundle implemented with audits and weekly feedback to clinicians.

- **Results**: From November 2002 to June 2003, VAP stayed between 0 and 12.8 VAP per ventilator-days. The average cost of VAP was $50,000 per episode.

Comparative Trial of the Silver-Coated Endotracheal Tube

• **Objective**: To determine whether a silver-coated endotracheal tube reduces the incidence of microbiologically confirmed VAP.

• **Study design**: Prospective, randomized, single-blind, controlled study in 54 North American centers. VAP incidence was based on quantitative bronchoalveolar lavage fluid culture with $\geq 10^4$ colony-forming units/mL.

• **Intervention**: Patients were assigned to undergo intubation with 1 of 2 high-volume, low-pressure endotracheal tubes, similar except for a silver coating on the experimental tube.

• **Results**: Rates of microbiologically confirmed VAP were 4.8% (37/766 patients) in the group receiving the silver-coated tube and 7.5% (56/743) ($P = .03$) in the control group, with a relative risk reduction of 35.9%. The silver-coated endotracheal tube was associated with delayed occurrence of VAP ($P = .005$).

• **Conclusion**: Patients receiving a silver-coated endotracheal tube had a statistically significant reduction in the incidence of VAP and delayed time to VAP occurrence compared with those receiving a similar, uncoated tube.

The Importance of Nursing Education

- **Study design**: European intensive care unit (ICU) nurses were tested on knowledge of evidence-based guidelines for preventing VAP. A validated multiple-choice questionnaire was distributed in 22 European countries from October 2006--March 2007.

- **Results**: There were 3329 questionnaires (response rate 69.1%). The average score was 45.1%.
  - 55% knew that the oral route is recommended for intubation;
  - 35% knew that ventilator circuits should be changed for each new patient;
  - 38% knew that heat and moisture exchangers were the recommended humidifier type, but only 21% knew that these should be changed once weekly;
  - 46% recommended closed suctioning systems; 18% knew that these must be changed for each new patient;
  - 51% recognized that subglottic secretion drainage reduced VAP;
  - 57% recognized that kinetic beds reduce VAP incidence; and
  - 85% knew that semi-recumbent positioning prevents VAP.

Prevention of VAP

• Standard infection control practices (e.g., hand hygiene).
• Minimizing duration/intensity of sedation and device exposure.
• Positioning patient in semi-recumbent position (40 degree).
• Appropriate use of enteral feeding, antibiotics and selected medical devices.
• Use of sterile water for irrigation.
• Closed suction system.
• Mouth care—chlorhexididine mouth/teeth cleaning.


Prevention Possibility: 50%-100%
Surgical Site Infections
Major Surgery Antimicrobial Prophylaxis: Baseline Results from the National Surgical Infection Prevention Project (SIPP)

- **Design**: National retrospective cohort study (medical record review).
- **Study population**:  
  - 2,965 hospitals  
  - systematic random sample  
  - 34,133 Medicare inpatients undergoing cardiac, vascular, colorectal, hip/knee and hysterectomy procedures from January 1-November 30, 2001.

SIPP Quality Indicators

- Antimicrobial Prophylaxis (AP)
  - Correct AP
  - AP given at the correct time (within 1 hour)*
  - AP stopped correctly

*Because of the longer required infusion times, vancomycin or fluoroquinolones, when indicated for beta-lactam allergy, may be started within 2 hours before the incision.

*Denominator for the aggregate is 5,210
Antibiotic Coating of Abdominal Closure Sutures and Wound Infection

- **Study design**: To prevent the contamination of suture material in surgical wounds, a comparative trial of triclosan-coated polyglactin 910 suture with antibacterial activity (Vicryl plus) vs. polydioxanone suture (PDS II) was conducted. In the first time period (TP1), a PDS II loop suture was used. In the second time period (TP2), Vicryl plus was used. The primary outcome was the number of wound infections.

- **Results**: 2,088 operations were performed from October 2004-September 2006 via midline incision. The wound infection rate was higher in the PDS II suture for abdominal wall closure period (TP1) than in TP2 using Vicryl plus (10.8% vs. 4.9%, P < .001). Other risk factors for the development of surgical site infections were comparable in the two groups.

- **Conclusion**: The use of antibiotic-coated loop suture for abdominal wall closure can decrease the number of wound infections after abdominal surgery.

Impact of an antimicrobial-impregnated gauze dressing on surgical site infections

**Study Design:** Sterile plain gauze dressings were replaced institution-wide by a comparable sterile antimicrobial gauze dressing (AMD) impregnated with 0.2% polyhexamethylene biguanide. SSIs, and specifically MRSA-SSIs, were tracked for the 11-month periods before/after the dressing switch, using Centers for Disease Control and Prevention criteria.

**Results:** There was a significant reduction in SSIs in the AMD period (84 SSIs/10,202 procedures [1.08%] than in the plain gauze period (101 SSIs/9372 surgical procedures (1.08%); P = .035).

**Conclusion:** A significant reduction in SSIs resulted from a simple change from plain sterile gauze to a sterile comparable antimicrobial dressing. This change reduced morbidity and possibly mortality after surgery, shortened hospital stays, and reduced the costs of post-surgical care.

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 extra-nasal sites on hospital admission may reduce this risk.

**Methods:** A randomized, double-blind, placebo-controlled, multi-center 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.

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).

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).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mupirocin–Chlorhexidine (N = 504)</th>
<th>Placebo (N = 413)</th>
<th>Relative Risk (95% CI)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>no. (%)</strong></td>
<td><strong>no. (%)</strong></td>
<td><strong>no. (%)</strong></td>
</tr>
<tr>
<td><strong>S. aureus infection</strong></td>
<td>17 (3.4)</td>
<td>32 (7.7)</td>
<td>0.42 (0.23–0.75)</td>
</tr>
<tr>
<td><strong>Source of infection</strong>†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Endogenous</td>
<td>12 (2.4)</td>
<td>25 (6.1)</td>
<td>0.39 (0.20–0.77)</td>
</tr>
<tr>
<td>2. Exogenous</td>
<td>4 (0.8)</td>
<td>6 (1.5)</td>
<td>0.55 (0.16–1.92)</td>
</tr>
<tr>
<td>3. Unknown</td>
<td>1 (0.2)</td>
<td>1 (0.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Localization of infection</strong>‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Deep surgical site†</td>
<td>4 (0.9)</td>
<td>16 (4.4)</td>
<td>0.21 (0.07–0.62)</td>
</tr>
<tr>
<td>2. Superficial surgical site‡</td>
<td>7 (1.6)</td>
<td>13 (3.5)</td>
<td>0.45 (0.18–1.11)</td>
</tr>
<tr>
<td>3. Lower respiratory tract</td>
<td>2 (0.4)</td>
<td>2 (0.5)</td>
<td>0.82 (0.12–5.78)</td>
</tr>
<tr>
<td>4. Urinary tract</td>
<td>1 (0.2)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5. Bacteremia</td>
<td>1 (0.2)</td>
<td>1 (0.2)</td>
<td></td>
</tr>
<tr>
<td>6. Soft tissue</td>
<td>2 (0.4)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

*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.

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

* 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
SSI Prevention Bundle

- Correct antimicrobial prophylaxis (current drug, given at correct time and discontinued at the correct time).
- No hair shaving
- Glucose control (peri-operative)
- Normothermia (except cardiac surgery)
- Pre-op screening for *S. aureus* (or MRSA) and if positive, decolonize (mupiricin/CHG baths/vanco prophylaxis)

Prevention Possibility: 40-60%
Methicillin-resistant
*Staphylococcus aureus* (MRSA)
Infection Prevention
True Universal MRSA Screening Dramatically Reduces MRSA Infection Rates

**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.

~ 70% reduction in MRSA-HAI s
Robicsek et al., Annals Intern Med 2008

On average: 16 hour Turn Around Time (TAT) from collection to result
MRSA-HAI: 67% reduction

PARADA et al., SHEA 2009, abstract 205

On average: 8 - 12 hour TAT from collection to result
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%).
Facilitywide--ADMISSION

FW-Swabbing on Admission to the Facility--by VISN

Percent of admissions screened for MRSA

Mar '07 Apr '07 May '07 Jun '07 Jul '07 Aug '07 Sep '07 Oct '07 Nov '07 Dec '07 Jan '08 Feb '08 Mar '08 Apr '08 May '08 Jun '08 Jul '08 Aug '08 Sep '08 Oct '08 Nov '08
Surgical Site Infections
Clean/Clean-Contaminated

MRSA Surgical Site Infections-by VISN
Clean/Clean Contaminated

RETROSPECTIVELY COLLECTED

PROSPECTIVELY COLLECTED

p<0.05, linear regression
MRSA Healthcare-Associated Infections in the ICU

ICU MRSA HCAIs by VISN

50% decrease

p<0.0001, linear regression
MRSA Healthcare-Associated Infections in the Non-ICU

Non-ICU MRSA HCAI Rates for FY 2008 by VISN

- 29% decrease
- P=0.02, linear regression

0.541

0.378
MRSA Prevention Bundle

• Screen high risk or all patients.
• Pre-operative screening of surgical implant patients; if MRSA-positive decolonize with intranasal mupiricin, CHG baths, and use vancomycin prophylaxis.
• Barrier precautions for MRSA positive patients.
• Hand hygiene
• Environmental cleaning

Prevention Possibility: ICU-50-75%; Hospital-wide: >25%; Surgical implant patients: nearly 100%
Conclusions

• Most HAI prevention interventions are low technology and not expensive.
• Combing these interventions into care bundles have had a major impact on reducing HAIs.
• Care bundles establish the minimum prevention practices all our clinicians should implement.
• It is critical that we educate our clinicians about the care bundle elements and how they should be fully implemented.
• Monitoring care bundle process measure compliance provides opportunities to enhance clinician practices and insures that all recommended measures are being implemented.
• We should all be striving to achieve a Zero Rate of preventable HAIs.
Thank you!