Improving the Quality of Care in Hospitals to Reduce Hospital Acquired Infections

Brian Koll, MD
Chief, Infection Control BIMC
Reducing Hospital Acquired Infections

- 1999  To Err is Human
- 2001  Crossing the Quality Chasm
- 2004  IHI 100K Campaign
- 2005  New York State Hospital Acquired Infection Reporting Initiative
- 2007  IHI 5 Million Lives Campaign

- Quality Improvement Collaboratives
  - Systemic approach to improve healthcare quality
  - Interdisciplinary teams
  - Test and measure innovations (PDSA cycles) to rapidly eliminate the gap between best evidence and best practices
  - Sharing experiences to accelerate learning and widespread adoption of best practices
PDSA Methodology

What are we trying to accomplish?

How will we know that a change is an improvement?

What changes can we make that will result in improvement?
## GNYHA/UHF CLABs Collaborative Participating Hospitals

<table>
<thead>
<tr>
<th>Beth Israel Medical Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronx-Lebanon Hospital Center</td>
</tr>
<tr>
<td>Brookdale Hospital Medical Center</td>
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<tr>
<td>Cabrini Medical Center</td>
</tr>
<tr>
<td>Good Samaritan Hospital Medical Center</td>
</tr>
<tr>
<td>Interfaith Medical Center</td>
</tr>
<tr>
<td>Kingsbrook Jewish Medical Center*</td>
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<tr>
<td>Kingston Hospital*</td>
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<tr>
<td>Lenox Hill Hospital</td>
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<tr>
<td>Long Beach Medical Center</td>
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<tr>
<td>Long Island College Hospital</td>
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<tr>
<td>Lutheran Medical Center</td>
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<tr>
<td>Montefiore Medical Center</td>
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<tr>
<td>Mount Sinai Hospital</td>
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<tr>
<td>Mount Sinai Hospital of Queens</td>
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<tr>
<td>New York Downtown Hospital</td>
</tr>
<tr>
<td>New York Hospital Queens*</td>
</tr>
<tr>
<td>New York Methodist Hospital</td>
</tr>
<tr>
<td>New York-Presbyterian Hospital</td>
</tr>
<tr>
<td>New York University Medical Center</td>
</tr>
<tr>
<td>North General Hospital</td>
</tr>
<tr>
<td>Our Lady of Mercy Medical Center</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>North Shore-Long Island Jewish Health System, including:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Hills Hospital</td>
</tr>
<tr>
<td>Franklin Hospital</td>
</tr>
<tr>
<td>Glen Cove Hospital</td>
</tr>
<tr>
<td>Huntington Hospital</td>
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<tr>
<td>Long Island Jewish Medical Center</td>
</tr>
<tr>
<td>North Shore University Hospital</td>
</tr>
<tr>
<td>Plainview Hospital</td>
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<tr>
<td>Southside Hospital</td>
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<tr>
<td>Staten Island University Hospital</td>
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<tr>
<td>Syosset Hospital</td>
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<tr>
<td>Peninsula Hospital Center</td>
</tr>
<tr>
<td>Richmond University Medical Center*</td>
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<tr>
<td>Sound Shore Medical Center of Westchester</td>
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<tr>
<td>St. Catherine of Siena Medical</td>
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<tr>
<td>St. Charles Hospital</td>
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<tr>
<td>St. Joseph's Medical Center, Yonkers*</td>
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<tr>
<td>St. Luke's - Roosevelt Hospital Center</td>
</tr>
<tr>
<td>St. Luke's Cornwall Hospital</td>
</tr>
<tr>
<td>St. Vincent's Medical Center, Manhattan*</td>
</tr>
<tr>
<td>Stamford Hospital</td>
</tr>
<tr>
<td>The Parkway Hospital*</td>
</tr>
<tr>
<td>Trinitas Hospital</td>
</tr>
<tr>
<td>Winthrop University Hospital*</td>
</tr>
<tr>
<td>Wyckoff Heights Medical Center</td>
</tr>
</tbody>
</table>

*Hospitals that joined the CLABs Collaborative in the second round of participation (i.e., in August/September 2006).
GNYHA-UHF CLABs Collaborative

• **Goal**
  
  • Prevent Central Line Associated Bloodstream Infections and deaths by implementing a set of interventions known as the “Central Line Bundle” in all patients requiring a central line.
Reducing CLAB Infections
Background and Statistics

- 250,000 CLAB infections in the hospital setting per year
- 80,000 CLAB infections in the ICU setting per year
- Expensive: Up to additional $56,000 in excess costs per case
- National costs of caring for patients with CLAB infection range from $296 million to $2.3 billion annually
- Mortality related to CLAB infections between 0% and 35%
38 hospitals participating, 56 ICUs*

At inception of Collaborative, hospital practice was widely variable across participants:

<table>
<thead>
<tr>
<th>Area of Focus</th>
<th>Consistently Use</th>
<th>Inconsistently Use</th>
<th>Do Not Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Goals Sheet</td>
<td>21</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Interdisciplinary Rounds</td>
<td>45</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Central Line Bundle</td>
<td>11</td>
<td>27</td>
<td>17</td>
</tr>
<tr>
<td>Ventilator Bundle</td>
<td>16</td>
<td>30</td>
<td>10</td>
</tr>
</tbody>
</table>

GREAT OPPORTUNITIES FOR IMPROVEMENT!

Responses obtained from ICUs within participating hospitals.

*Note that these were responses from the original group of 38 CLABs Collaborative participating hospitals.
GNYHA-UHF CLABs Collaborative Design

- Systematic model for change that would
  - Meet needs of hospitals within the region
  - Use existing staffing and financial resources
GNYHA/UHF CLABs Collaborative Design

- Hospital leadership involvement and commitment
- Interdisciplinary teams / Physician and Nurse champions
- Evidence-based interventions: Implemented “Central Line Bundle”
- 3 learning sessions: Reviewed key interventions for eliminating CLAB infections, guidelines for inserting central line, materials needed, maintaining central lines, hospital best practices, and approaches to sustaining improvements.
- Bi-weekly conference calls: Shared information / tools specific to reducing CLAB infections.
- Collaborative web site for information-sharing: http://jeny.ipro.org/clabs
- “Expert on Call” clinical consultant
- Reinforcement of “zero tolerance” for CLAB infections

- Standardized Materials: Teams developed and used standardized data collection and definitions
- Root Cause Analysis (RCA): Real time RCAs encouraged to identify reasons for CLABs and develop solutions for prevention
- Tracking Success: Aggregate and hospital-specific results reported monthly and site visits made by Collaborative sponsors to identify areas in need of support

Central Line Bundle: Hospital teams identified the “central line bundle” as a strategy to prevent infection during central line insertion. Components include: hand hygiene, use of maximal barrier precautions, chlorhexidine skin use, site of line placement, and review of line necessity. All necessary supplies should be available at the patient’s bedside when needed (creation of central line insertion kit).
GNYHA/UHF CLABs Quality Improvement Collaborative

Infection control in healthcare settings has emerged as a top priority across the country. A large and growing body of evidence demonstrates that infections cause significant harm to patients while adding major costs to healthcare delivery. JCAHO has designated infection control as one of its National Patient Safety Goals, and the Centers for Medicare & Medicaid Services is developing several quality improvement measures focusing on infection control. In December 2004, the Institute for Healthcare Improvement challenged the healthcare community to commit to specific goals for patient safety improvement, including reduction of central line associated bloodstream infections (CLABs) acquired in intensive care units (ICUs).

The Greater New York Hospital Association (GNYHA) and United Hospital Fund (UHF) have embarked upon a Quality Improvement Collaborative supporting the use of proven infection control practices in ICUs to improve the quality of care and patient safety. Thirty-eight hospitals throughout the Greater New York region are participating in the CLABs Collaborative, with the primary goal of reducing central line associated bloodstream infections. This website, called Joint Effort New York (Jeny), which is administered through IPRO, serves as the Collaborative’s information-sharing resource center, and we encourage participating hospitals to view important information, documents, and tools, as well as to share best practices here.

What’s New and Helpful Resources

- Now! Maintenance Questionnaire, discussed during conference call on 3/7/07: [Complete Maintenance Questionnaire Now]
- Listen now! Hot Topic, continued discussion about MRSA, Latest Conference Call Recording for Participating Hospitals: 2/07/07
- Latest Conference Call Recording for NEW Participating Hospitals (note: after 1/2007, calls for new participating hospitals are on same schedule as those of original participating hospitals): 1/10/07
- Next Conference Call for all CLABs Participating Hospitals: 04/04/07, 2p.m.
- Photos Included: See Materials from Kick-off Meeting for Hospitals Joining the CLABs Collaborative: 2/03/06, 9:30am to 1:30pm
- NEW EXAMPLES! Examples of CLABs Collaborative Best Practices & Data Collection Forms
- Photos Included: See Materials from Learning Session Three: One Year Progress: CLABs Collaborative Accomplishments and Next Steps: 5/24/06, 7:45am to 3:30pm
- Algorithm for Defining Central Line and BSIs
- See Materials from Learning Session Two: System Approaches to Sustaining Improvements in Quality and Patient Safety. Photos Included: 10/19/05, 7:45am to 4:30pm
- See GNYHA’s Skyline Newsletter (Oct 31, 2005) for articles describing the CLABs Second Learning Session and Paul O’Neill’s discussion with the GNYHA Board of Governors
- Watch Dr. Richard Shannon’s presentation on Allegheny General Hospital’s experience, which was described at the May 6, 2005 CLABs Quality Improvement Collaborative kick-off meeting.

CLABs Collaborative Website: [http://jeny.ipro.org/clabs]
Examples of Findings from Root Cause Analyses

**Line Maintenance**
- Line not changed on timely basis
- Line in for too long
- Dressing not changed using aseptic techniques
  - IV tubing not labeled properly to change
- Line not manipulated appropriately

**Technique not adequate**
- Not compliant with hand hygiene
  - Line inserted w/o sterile technique
  - Inadequate use of maximal barrier precautions
  - Inadequate prep before insertion
- Femoral line chosen instead of subclavian

**Lack of Education and Staffing**
- Inexperienced residents and clinicians
- Clinicians not knowledgeable about Central Line Bundle
- Nurses do not properly know how to change dressings
- MD does not get someone to assist with line insertion
- Nurses too busy to check & change dressings

**Central Line–Associated Bloodstream Infection**
Barriers and Solutions

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of Compliance</td>
<td>- Development of central line insertion &amp; maintenance kits</td>
</tr>
<tr>
<td>• Maintenance</td>
<td>- Creation of monitoring tools to assure compliance with bundle components</td>
</tr>
<tr>
<td>• Technique</td>
<td>- Empowerment of nursing staff to stop procedure when bundle not followed</td>
</tr>
<tr>
<td></td>
<td>- Daily rounds to assess line necessity and assure appropriate maintenance</td>
</tr>
<tr>
<td>Lack of Education &amp; Staffing</td>
<td>- Development of Department/Hospital-wide educational programs re: insertion and maintenance</td>
</tr>
<tr>
<td></td>
<td>- Reorganization of staffing to monitor and assure compliance</td>
</tr>
<tr>
<td></td>
<td>- Creation of protocols in which nursing signs off on dressing rounds</td>
</tr>
<tr>
<td>Lack of Standardized Data Collection</td>
<td>- Adoption of CDC’s NHSN definitions</td>
</tr>
<tr>
<td></td>
<td>- Monthly data fed back (CLAB infection rates) to participating hospitals and staff</td>
</tr>
</tbody>
</table>
GNYHA-UHF Collaborative
Monthly Data Results*

*Includes data from 36 of the 38 original participating hospitals
**GNYHA-UHF Collaborative**

**15-Month Data Results**

**Bundle Implementation**:
- 88% reported full implementation; remaining 12% in process of fully implementing
- Mean pre-bundle implementation CLAB infection rate = 4.02 infections / 1,000 central line days
- Mean post-bundle implementation rate = 1.79 infections / 1,000 (p Value <0.0001)

**Overall Aggregate CLAB Infection Data**:
- Mean baseline rate = 4.86 infections / 1,000 central line days
- Mean fifteen-month study period infection rate = 2.38 infections / 1,000
- 51% overall decrease (p Value <0.0001)

**Comparison of CLAB Infection Data in 3-month Cohorts during 15-month Study Period**:
- Mean first three months (July through September 2005) = 3.10 infections / 1,000 central line days
- Mean last three months (July through September 2006) = 1.76 infections / 1,000
- 43% decrease during the course of the study period (p Value = 0.015)

**Maintaining Zero CLAB Infections during 15-month Study Period**:
- 29 hospitals (81%) maintained zero for at least 3 months
- 8 hospitals (22%) maintained zero during the last 6 months

**Notes**:
1. Bundle implementation, reported by 34 of the 38 original participating hospitals through an Interventions Survey developed by Collaborative sponsors, April 2006.
2. Study Period includes data collected by 36 of the 38 original participating hospitals from July 2005 through September 2006.
*Includes data from 36 of the 38 original participating hospitals.*
Dashing the Dogma of Inevitable Health Care-associated Infections

CLABs

• 100% compliance with CLABs bundle within 60 days
• Sustained elimination of CLABs within 90 days
• Median duration without a CLAB = 274 days
• Significant decrease in overall CLABs rate from 2.0% to 0.6% of patients with a central line. An estimated ten lives were saved through prevention of CLABs.
• $1,330,000 savings in avoided costs.
<table>
<thead>
<tr>
<th>Unit</th>
<th>Maximum Days Without CLAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac ICU</td>
<td>432</td>
</tr>
<tr>
<td>Surgical ICU</td>
<td>431</td>
</tr>
<tr>
<td>Emergency Room</td>
<td>396</td>
</tr>
<tr>
<td>Medical/Surgical ICU</td>
<td>387</td>
</tr>
<tr>
<td>Pediatric ICU</td>
<td>274</td>
</tr>
<tr>
<td>Cardiac Surgery ICU</td>
<td>274</td>
</tr>
<tr>
<td>Neonatal ICU</td>
<td>255</td>
</tr>
<tr>
<td>Surgical Stepdown</td>
<td>245</td>
</tr>
<tr>
<td>Non-ICU</td>
<td>240</td>
</tr>
<tr>
<td>Medical ICU</td>
<td>213</td>
</tr>
<tr>
<td>Respiratory Stepdown</td>
<td>167</td>
</tr>
</tbody>
</table>
Lessons Learned - CLABs

GNYHA/UHF CLABs Collaborative: Multicenter Initiative to Reduce CLABs
Annual NPSF Patient Safety Congress, May 3-4, 2007 in Washington, DC.

• Hospital factors specific to individual institutions appear to be a greater influence on infection risk than a patient’s severity of illness

• Support of hospital leadership and identification of physician and nursing champions

• Support of nonclinical staff
Central Line Insertion Kit
Lessons Learned - CLABs

- Easy to follow evidence based patient care practice bundles
- PDSA methodology was applicable across many hospitals on a variety of units
  - Data collection and analysis
  - Root cause analysis, analysis of defects
  - JENY site
- Limited additional resources were necessary for the success of this initiative
BETH ISRAEL MEDICAL CENTER
VASCULAR ACCESS PROCEDURE NOTE

Date: ____________________________
Time Out at ______ AM/PM
Verified Correct (all must be verified): □ Patient  □ Procedure  □ Site/Side
□ Position  □ Supplies  □ Equipment

___________________________________ RN/MD___________________________________ RN/MD

Central vein: □ R  □ L
Pulmonary artery: □ R  □ L
Transvenous pacemaker □ R  □ L
□ subclavian □ internal jugular □ femoral (if femoral, reason for choice)

_____________________________________

Arterial: □ R  □ L  □ radial  □ femoral  □ other________________________

Indication(s):
_____________________________________

Consent in chart □  Operator(s): ________________________________

Central Line Check List:

1. all equipments at bedside  8. Time-out
2. Wash hands  9. Mask
3. Chlor- prep  10. procedure with sterile technique
5. Gloves  12. Dressing with date
6. Cap  13. Dispose sharps
7. Drape  14. wash hands

Anesthesia: ________________________________________________________________

Technique: ________________________________________________________________

Comments: ________________________________________________________________

Complications: ______________________________________________________________

_____________________________________
Signature/Title
Time: ____________
Lessons Learned – CLABs

GNYHA/UHF CLABs Collaborative: Multicenter Initiative to Reduce CLABs Infections
Annual NPSF Patient Safety Congress, May 3-4, 2007 in Washington, DC.

• Culture change regarding the goal of zero CLABs infections was applicable for this device related infection and is applicable for all hospital acquired infections and patient safety issues
  • MRSA
  • C difficile
  • GNYHA/UHF Rapid Response System Collaborative
  • Critical Care Leadership Network
Prevention of Multidrug-Resistant Organisms

Centers for Disease Control and Prevention
“...call to action...This is a national priority”

Joint Commission
Each institution needs to define what their MDRO problem is through their risk assessment for infectious agents.

Attention focusing on MRSA
- Most common MDRO
- > 50% of all *S. aureus* health-care associated infections
- >60% of ICU acquired *S. aureus* infections
- Community acquired strains
The Case for Reducing MRSA Infection

- Incidence of MRSA infections has increased dramatically over the past decade
  - Pediatrics 20 fold increase
  - Primary Care 11 fold increase
  - Prisons 9 fold increase
  - Urgent Care 4 fold increase

- Higher mortality rate when compared to methicillin-susceptible staphylococcal infections
The Case for Reducing MRSA Infection

Institute for Healthcare Improvement

- > 126,000 hospitalized patients acquire MRSA
- > 5,000 die as a result of MRSA infection

- Benefit in control of other antibiotic resistant bacteria
  - VRE and C difficile
Community Acquired MRSA
Community Acquired MRSA
Vancomycin Resistance
Epidemic Community Acquired MRSA Strain
46th ICAAC, San Francisco; Sept 27 – 30, 2006

- USA300 VISA isolate
- Intermediate resistance developed after six-weeks of treatment with vancomycin

- Has necessary plasmids to be receptive to a genetic transfer of vancomycin resistance from VRE
  - Clindamycin resistance
  - Mupirocin resistance

- Displacing traditional nosocomial strains and becoming predominant in some hospitals
  - More severe infections
    - Necrotizing pneumonia, toxic shock
  - San Francisco
    - 68% of all infections
    - Pediatrics
Colonized patients comprise the reservoir for transmission.

Colonized patients have a high rate of MRSA infection:
- Nearly 1/3 develop infection, often after discharge
- Relative risk of 7.1 for developing a SSI

Colonization is long-lasting and patients can transmit MRSA to patients in other health care settings (e.g., nursing homes) and to family members.
Hospital Leadership

- Continued intolerance of the status quo and promotion of the will to improve – “getting to zero”
- Continued empowerment of front-line interdisciplinary teams to get the job done
- Hold staff accountable for reliable performance of basic infection control practices, such as hand hygiene
- Acknowledge magnitude and consequences of problem
  - Emphasize “business case” for MRSA reduction
  - Cost-beneficial and cost-saving
Multi-disciplinary Team Members

Physicians
- Chief Executive Officer
- Chief Medical Officer
- Associate Chairman, Department of Medicine
- Director
  - ICU, MICU, SICU
  - Emergency Room
  - Medical and Emergency Department Residency Programs
- Intensivist
- Critical Care Fellow

Infection Control
- Hospital Epidemiologist
- Manager
- Practitioner

Patient Care Services
- Vice President
- Director
- Nurse Manager
  - ICU, MICU, SICU
  - Emergency Room
- Nurse Education Manager

Other
- Director
  - Materials Management
  - Housekeeping
  - Transport
  - Respiratory Therapy
  - Quality Improvement
- Pharmacist
- Dietician
- Microbiologist
Dashing the Dogma of Inevitable Health Care-associated Infections

- It is not good enough that our infection rates are below national benchmarks.

- HAIs are preventable, they are not an inevitable consequence of sophisticated, complex care that we provide to our severely ill patients.

- HAIs can be eliminated by determination as opposed to additional resources.
PDSA Methodology

GNYHA/UHF CLABs Collaborative: Multicenter Initiative to Reduce CLABs
Annual NPSF Patient Safety Congress, May 3-4, 2007 in Washington, DC.

What are we trying to accomplish?

How will we know that a change is an improvement?

What changes can we make that will result in improvement?
Define the Problem
Infection Control – Multi-drug Resistant Organisms
2006

Unit

Number of Patients

MICU
SICU
CSICU
PICU
CCU
NICU

MRSA
VRE
MDR Kleb
MDR Acin
MDR Psae
C. diff
Define the Problem

- 4% in excess in-hospital mortality
- 9.1 days excess length of stay
- $20,000+ in excess cost per case
MRSA Bundle
5 Components of Care
Institute for Healthcare Improvement

- Hand hygiene
- Contact Precautions
- Device Bundles
- Decontamination
  - Environment
  - Equipment
- Active Surveillance Cultures
Hand Hygiene Compliance
Jan – Dec 2006
n = 1,134
# Hand Hygiene Compliance

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lack of Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10B</td>
<td>MD, RN</td>
</tr>
<tr>
<td>10D</td>
<td>RN, PCA</td>
</tr>
<tr>
<td>CCU</td>
<td>Nursing Student</td>
</tr>
<tr>
<td>ED</td>
<td>MD</td>
</tr>
<tr>
<td>MICU</td>
<td>EEG Tech</td>
</tr>
<tr>
<td>PACU</td>
<td>RN</td>
</tr>
<tr>
<td>SICU</td>
<td>MD, Medical Student</td>
</tr>
</tbody>
</table>
Contact Precautions

Examples of diseases/illnesses that require precautionary measures.

<table>
<thead>
<tr>
<th>Contact Precautions Disease List</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Clostridium difficile</em></td>
</tr>
<tr>
<td>Colonization or infection with a MDR organism</td>
</tr>
<tr>
<td>MRSA, VRE, multi-drug resistant <em>Klebsiella, Acinetobacter, Pseudomonas or E. coli</em></td>
</tr>
<tr>
<td>Impetigo</td>
</tr>
<tr>
<td>Pediculosis or scabies until treated for 24 hrs</td>
</tr>
<tr>
<td>Respiratory Syncytial Virus</td>
</tr>
<tr>
<td>Shingles in immune competent host</td>
</tr>
<tr>
<td><em>Herpes simplex</em> (disseminated or severe mucocutaneous)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Airborne Precautions Disease List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubeola (measles)</td>
</tr>
<tr>
<td>Tuberculosis (suspected or confirmed)</td>
</tr>
<tr>
<td>Droplet Precautions Disease List</td>
</tr>
<tr>
<td>Group A Streptococcal pharyngitis</td>
</tr>
<tr>
<td><em>H. influenzae</em> (pneumonia, meningitis, epiglottis)</td>
</tr>
<tr>
<td>Mumps, Influenza, Parovirus 19, Adenovirus</td>
</tr>
<tr>
<td>Rubella</td>
</tr>
<tr>
<td><em>Mycoplasma pneumoniae</em></td>
</tr>
<tr>
<td>N meningitides (meningitis, pneumonia, bacteremia)</td>
</tr>
<tr>
<td>Pneumonic plague</td>
</tr>
<tr>
<td>Airborne + Contact Precautions (Strict)</td>
</tr>
<tr>
<td>Varicella (disseminated zoster in anyone, shingles in an immunocompromised host, chickenpox)</td>
</tr>
<tr>
<td>SARS, smallpox, avian influenza, hemorrhagic fevers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact Precautions Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write the order for “Contact Precautions”</td>
</tr>
<tr>
<td>If possible, cohort with a similar patient</td>
</tr>
<tr>
<td>• Gloves should always be worn; gowns are required if anticipate contact with patient</td>
</tr>
<tr>
<td>If multi-drug resistant gram-negative:</td>
</tr>
<tr>
<td>• Must be cohorted or placed in a private room</td>
</tr>
<tr>
<td>• Gown and glove before entering the room</td>
</tr>
<tr>
<td>• Remove gown and gloves before exiting the room</td>
</tr>
<tr>
<td>• Dedicated equipment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Airborne Precautions Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place patient in a negative pressure room</td>
</tr>
<tr>
<td>Write the order for “Airborne Precautions”</td>
</tr>
<tr>
<td>Keep the door closed at all times</td>
</tr>
<tr>
<td>N-95 respirator must be worn</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Droplet Precautions Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write the order for “Droplet Precautions”</td>
</tr>
<tr>
<td>Surgical mask should be worn when within 3’ of the patient</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Airborne + Contact Precautions (Strict) Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place patient in a negative pressure room</td>
</tr>
<tr>
<td>Write the order for “Airborne + Contact Precautions”</td>
</tr>
<tr>
<td>Keep the door closed at all times</td>
</tr>
<tr>
<td>N-95 respirator must be worn</td>
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<tr>
<td>Gown and glove before entering the room</td>
</tr>
<tr>
<td>Remove gown and gloves before exiting the room</td>
</tr>
<tr>
<td>Dedicated equipment</td>
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</tbody>
</table>

- Hand hygiene should be performed for all patients before entering and leaving a room. Hand washing must be done for *C. difficile*, anthrax or any other spore forming organism.
- Transport into and out of rooms should be limited for essential purposes only. For droplet, airborne or airborne + contact (strict) a surgical mask must be worn by the patient during transport.
- All areas receiving a patient on precautions must be notified before hand – including transport.
## Contact Precautions

### PATIENTS ON ISOLATION PRECAUTIONS

<table>
<thead>
<tr>
<th>Patient</th>
<th>MR#</th>
<th>Room</th>
<th>Source</th>
<th>Organism</th>
<th>Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>6</td>
<td>5L02A</td>
<td>Blood</td>
<td>MDR Acinetobacter / VRE</td>
<td>Strict Contact</td>
</tr>
<tr>
<td>G</td>
<td>7</td>
<td>5L03A</td>
<td>Urine / Wound</td>
<td>MDR Klebsiella / VRE</td>
<td>Strict Contact</td>
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<tr>
<td>H</td>
<td>8</td>
<td>5L03B</td>
<td>Blood</td>
<td>MDR Acinetobacter / VRE</td>
<td>Strict Contact</td>
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<tr>
<td>I</td>
<td>9</td>
<td>5L03C</td>
<td>Blood / Nasal</td>
<td>MDR Klebsiella / MRSA</td>
<td>Strict Contact</td>
</tr>
<tr>
<td>J</td>
<td>10</td>
<td>5L04C</td>
<td>Wound</td>
<td>MDR Klebsiella / MDR Pseudomonas / VRE/MDR Acinetobacter</td>
<td>Strict Contact</td>
</tr>
<tr>
<td>M</td>
<td>13</td>
<td>SICU10</td>
<td>Blood / Wound</td>
<td>MRSA</td>
<td>Contact</td>
</tr>
<tr>
<td>N</td>
<td>14</td>
<td>SICU01</td>
<td>Abscess</td>
<td>VRE</td>
<td>Contact</td>
</tr>
<tr>
<td>O</td>
<td>15</td>
<td>11L16P</td>
<td>Wound</td>
<td>MRSA / C. difficile</td>
<td>Contact</td>
</tr>
<tr>
<td>P</td>
<td>16</td>
<td>11L12B</td>
<td>Stool</td>
<td>MRSA</td>
<td>Contact</td>
</tr>
<tr>
<td>U</td>
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<td>5L01B</td>
<td>Nasal</td>
<td>MRSA</td>
<td>Contact</td>
</tr>
<tr>
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<td>22</td>
<td>5L02B</td>
<td>Sputum</td>
<td>MRSA</td>
<td>Contact</td>
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<td>MICU07</td>
<td></td>
<td>C. difficile</td>
<td>Contact</td>
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<tr>
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<td>11L12B</td>
<td></td>
<td>C. difficile</td>
<td>Contact</td>
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<tr>
<td>Y</td>
<td>25</td>
<td>10D05S</td>
<td></td>
<td>C. difficile</td>
<td>Contact</td>
</tr>
</tbody>
</table>

March 7, 2007
Patients with Multi-Drug Resistant (MDR) or Pan-Drug Resistant (PDR) Acinetobacter, Klebsiella, etc. should be on strict contact precautions and cohorted on 5 Linsky. Staff caring for these patients should not care for other non-infected patients. Equipment used on these patients should not be used on non-infected patients.

Care givers should wear gowns and gloves when entering the room to see these patients. Masks should be worn if suctioning is necessary.

Rooms must be terminally cleaned after a patient with this organism is discharged and cleared by Infection Control before a new patient is admitted.

Patients with *Clostridium difficile* should be cohorted. Upon discharge, the room must be terminally cleaned using a 1:10 bleach solution after initial cleaning with the hospital approved germicide. While a patient is in the hospital a 1:100 bleach solution should be used for daily cleaning as needed.
Device Bundles

- Patients with invasive devices who are colonized with MRSA are at greatly increased risk of MRSA bloodstream infection and pneumonia.
- Fastidious care of invasive devices can greatly diminish the occurrence of MRSA infection in colonized patients.
Decontamination of Environment and Equipment
Decontamination of Environment and Equipment

Housekeeper
Please Terminally Clean this Room

Room Number: ________
Prior Patient on Precautions: Y N

If on Contact Precautions:
Bleach Protocol for C. difficile
Room Must Be Cultured for Acinetobacter if prior patient with MDR Acinetobacter

Cleaned by: __________
Date Cleaned: __________
To Be Cultured by Infection Control: Yes ____ No ____

Note:
1 - MDR Acinetobacter must be cultured by Infection Control – URGENT
2 - Housekeeper must clean this room first and report to supervisor and Nurse Manager when completed and sign off sheet too.
Hospital Acquired Methicillin Resistant *S. aureus* 2003 – 2006

![Graph showing the rate per 1,000 discharges for hospital-acquired Methicillin Resistant *S. aureus* from 2003 to 2006. The graph compares the rates between the Manhattan Campus, Brooklyn Campus, and the National rates.](image-url)
### Decreasing Incidence of MDROs!

<table>
<thead>
<tr>
<th></th>
<th>BIMC</th>
<th>Petrie</th>
<th>KHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRSA</td>
<td>65%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>VRE</td>
<td>15%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>MDR <em>Klebsiella</em></td>
<td>15%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>MDR <em>Acinetobacter</em></td>
<td>45%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td><em>C. difficile</em></td>
<td>10%</td>
<td>35%</td>
<td></td>
</tr>
</tbody>
</table>

Costs avoided: $1.5 million
Active Surveillance Cultures

- Brigham and Women’s Hospital
  - ICUs on admission and weekly thereafter
  - 75% reduction in MRSA in the ICUs
  - 40% reduction in MRSA in non-ICUs

- Pittsburgh Region
  - 90% reduction in MRSA in MICU
  - 55% reduction in MRSA hospital wide

- Infection Control Professionals of Southern New England
Active Surveillance Cultures

Most beneficial when the other components of the bundle are performed with a high degree of reliability

Most sensitive approach is to perform active surveillance cultures on all admitted patients without using risk-based criteria

Provide real-time notification to staff when an admission culture is positive for MRSA, so precautions can be implemented immediately
Active Surveillance Cultures

Not all studies have reached the same conclusions

- Failure to identify cross-transmission of MRSA or MSSA in MICU during a 10 week period when active surveillance cultures obtained, despite the fact that culture results were not reported to the staff
- Cohorting and adherence to transmission based precautions important determinants of transmission prevention

Optimal timing? Optimal interval?
Active Surveillance Cultures

• Manhattan Campus
  • 19% MICU admissions colonized
    • 5% acquired MRSA during MICU stay
    • 33% persistently colonized
    • 43% co-colonized with VRE
  • 3% of CSICU admissions colonized

• Brooklyn Campus
  • 13% ICU admissions colonized
PFGE S. aureus isolates
Preoperative Use of Mupirocin for Prevention of Healthcare-Associated *S. aureus* Infections

*Infect Control Hosp Epidemiol* 2006; 27:1304-1312

- Nasal carriage of *S. aureus* is associated with a relative risk of 7.1 for developing a SSI
- Endogenous strain accounts for >80% of cases

- Screen and Treat
- Treat All
- No Screen and No Treat

- Prevention 86 infections for every 10,000 patients
- Savings of $12,000 per infection prevented
Find What Works Best

- Define your MRSA high-risk area
  - Well-defined geographical area and patient population
    - ICU
    - surgical patients
- Start small to achieve rapid success
- Vigorous clinical champion or opinion leader
- Work as an interdisciplinary team
  - Environmental services
  - Transporters
Find What Works Best

• Feed back compliance data in real-time
• Monitor impact of change on MRSA transmission
  • Rate using a denominator of “patient days” or “patient discharges”
• Demonstrate that the additional investment in resources pays off
• Celebrate success and move/spread to other areas of the hospital
Thank You