Healthcare-Associated Infections: Moving Toward Elimination

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November 19, 2010
Elimination of Infectious Diseases

Maximal reduction of “the incidence of infection caused by a specific agent in a defined geographical area as a result of deliberate efforts; continued measures to prevent reestablishment of transmission are required.”

LOCAL AND NATIONAL SUCCESSES
Examples of Local Successes: Implementation of CDC Guidelines

Pittsburgh Regional Healthcare Initiative

Overall rate reduction of 68%

Michigan Keystone Initiative

ICUs at 103 Michigan hospitals, 18 months

Overall rate reduction of 66%

Trends in Bloodstream Infections by ICU types, NHSN Hospitals, 1997–2007

- 2001 onward: MRSA CLABSI decreased in all 6 ICU types: -51.5% to -69.2% relative change

Estimated:
- 7,000 BSIs prevented
- 1,800 lives saved
- $50-$180M in costs averted annually

Burton DC et al. JAMA 2009;301:727-36.

**Table 3.** Modeled Yearly Percent Change for All Invasive Methicillin-Resistant *Staphylococcus aureus* (MRSA) Infections and Bloodstream Infections, January 2005-December 2008

<table>
<thead>
<tr>
<th>Epidemiological Category</th>
<th>Modeled Yearly Percent Change (95% Confidence Intervals), %&lt;sup&gt;a&lt;/sup&gt;</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All invasive MRSA infections</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital-onset</td>
<td>-9.4 (-14.7 to -3.8)</td>
<td>.005</td>
</tr>
<tr>
<td>Health care–associated community-onset</td>
<td>-5.7 (-9.7 to -1.6)</td>
<td>.01</td>
</tr>
<tr>
<td><strong>MRSA bloodstream infections</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital-onset</td>
<td>-11.2 (-15.9 to -6.3)</td>
<td>.001</td>
</tr>
<tr>
<td>Health care–associated community-onset</td>
<td>-6.6 (-9.5 to -3.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Dialysis in last year</td>
<td>-6.4 (-11.4 to -1.1)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.02</td>
</tr>
<tr>
<td>No dialysis in last year</td>
<td>-7.2 (-11.4 to -2.8)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.006</td>
</tr>
</tbody>
</table>

<sup>a</sup> Multilevel model adjusted for age and race unless otherwise specified.

<sup>b</sup> Unadjusted multilevel model.
CURRENT STATE OF KNOWLEDGE
HICPAC/CDC Guideline Development Process

- Extensive systematic reviews of the medical literature
- Recommendations graded according to evidence basis
  - Generally supported by high-quality evidence
  - Some by indirect evidence or expert consensus
- Close collaboration with professional organizations (IDSA / SHEA)
Example of Evidence-Based Practice: Effect of Hand Hygiene on Resistant Organisms

<table>
<thead>
<tr>
<th>Year</th>
<th>Author</th>
<th>Setting</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>Maki</td>
<td>Adult ICU</td>
<td>Reduction in infection rates</td>
</tr>
<tr>
<td>1984</td>
<td>Massanari</td>
<td>Adult ICU</td>
<td>Reduction in infection rates</td>
</tr>
<tr>
<td>1994</td>
<td>Webster</td>
<td>NICU</td>
<td>Elimination of MRSA</td>
</tr>
<tr>
<td>1995</td>
<td>Zafar</td>
<td>Newborn nursery</td>
<td>Elimination of MRSA</td>
</tr>
<tr>
<td>2000</td>
<td>Pittet</td>
<td>Hospitalwide</td>
<td>Reduction in infections and MRSA cross-transmission rates</td>
</tr>
</tbody>
</table>

Source: Guideline for Hand Hygiene in Health-care Settings. MMWR 2002;51(RR-16)
HICPAC/CDC Evidence-Based Prevention Recommendations

- Developed for each type of infection
  - Prevention of central-line associated bloodstream infections (CLABSI)
  - Prevention of catheter associated urinary tract infections (CAUTI)
  - Prevention of surgical site infections (SSI)
  - Prevention of healthcare-associated pneumonia
  - Management of multi-drug resistant organisms

- Guidelines contain many recommendations
Development of Toolkits for HAI Prevention

- Distilled current recommendations for optimal prevention strategies
  - Core Strategies
    - High levels of scientific evidence
    - Demonstrated feasibility
  - Supplemental Strategies
    - Some scientific evidence
    - Variable levels of feasibility
# HAI Prevention Toolkits

[http://www.cdc.gov/HAI/recoveryact/stateResources/toolkits.html](http://www.cdc.gov/HAI/recoveryact/stateResources/toolkits.html)

## Toolkits

<table>
<thead>
<tr>
<th>Toolkit</th>
<th>Description</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAUTI</strong></td>
<td>Catheter-associated Urinary Tract Infection (CAUTI) Toolkit</td>
<td>[PDF - 996 KB]</td>
</tr>
<tr>
<td><strong>CDI</strong></td>
<td><em>Clostridium difficile</em> (CDI) Infections Toolkit</td>
<td>[PDF - 1.04 MB]</td>
</tr>
<tr>
<td><strong>CLABSIs</strong></td>
<td>Central Line-associated Bloodstream Infections (CLABSIs) in Non-Intensive Care Unit (non-ICU) Settings Toolkit</td>
<td>[PDF - 508 KB]</td>
</tr>
<tr>
<td><strong>SSI</strong></td>
<td>Surgical Site Infection (SSI) Toolkit</td>
<td>[PDF - 208 KB]</td>
</tr>
</tbody>
</table>

## Evaluating Environmental Cleaning

- **Available for download** [PDF - 333 KB]
- **Appendices to the Conceptual Program Model for Environmental Evaluation** [PDF - 176 KB]
- **CDC Environmental Checklist for Monitoring Terminal Cleaning** [PDF - 63 KB]
- **CDC Environmental Checklist** [Word - 52 KB]
- **Environmental Cleaning Eval Worksheet** [Excel - 63 KB]

## Long Term Care

- **Available for download** [PDF - 205 KB]
- **Inter-facility Infection Control Transfer Form** [PDF - 176 KB]
- **Inter-facility Infection Control Transfer Form** [Word - 74 KB]

## MRSA

- **Available for download** [PDF - 74 KB]
- **MRSA Baseline Prevention Practices Assessment Tool For States Establishing HAI Prevention Collaboratives Using Recovery Act Funds** [PDF - 229 KB]
Example of MDRO-Specific Guidance: Surveillance and Infection Prevention Measures

Guidance for Control of Infections with Carbapenem-Resistant or Carbapenemase-Producing Enterobacteriaceae in Acute Care Facilities

Infection with carbapenem-resistant Enterobacteriaceae (CRE) or carbapenemase-producing Enterobacteriaceae is emerging as an important challenge in health-care settings (1). Currently, carbapenem-resistant Klebsiella pneumoniae (CRKP) is the species of CRE most commonly encountered in the United States. CRKP is resistant to almost all available antimicrobial agents, and infections with CRKP have been associated with high rates of morbidity and mortality, particularly among persons with prolonged hospitalization and those who are critically ill and exposed to invasive devices (e.g., ventilators or central venous catheters). This report provides updated recommendations from CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC) for the control of CRE or carbapenemase-producing Enterobacteriaceae in acute care (inpatient) facilities. For all acute care facilities, CDC and HICPAC recommend an aggressive infection control strategy, including managing all patients with CRE using contact precautions and implementing Clinical and Laboratory Standards Institute (CLSI) guidelines for detection of carbapenemase production. In areas where CRE are not endemic, acute care facilities should 1) review microbiology records for the preceding 6--12 months to determine whether CRE have been recovered at the facility, 2) if the review finds previously unrecognized CRE, perform a point
Current State of Affairs: Suboptimal Adherence to Proven Practices

- Average hand hygiene compliance: ~40%
- Compliance with timing of surgical prophylaxis: ~40%
- Full compliance with key guidelines to prevent HAIs: 30%-38% of U.S. hospitals
- Continued outbreaks due to inattention to basic infection control
- CDC guidelines not always part of federal standards/regulations
IMPROVING ADHERENCE TO EVIDENCE-BASED PRACTICES
Collaborative and Integrated Approach

- Targeted education
- Alignment of incentives
- Partnerships and collaborations
Collaborative and Integrated Approach

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Educational Intervention to Improve Environmental Cleaning (I)

Study Design (n=36 hospitals)

- Pre-intervention: 48% cleaning rate of a sample of 14 different types of high-risk contact surfaces
  - Lowest mean cleaning rates (22–29%): bathroom door knobs, handhold, light switch; room door knobs; bedpan cleaner

- Phase II: standardized educational presentation

- Phase III: Performance feedback, additional interventions (programmatic)

Educational Intervention to Improve Environmental Cleaning (II)

Results

- Change in mean rate of cleaning over study period
- High-risk contact surfaces with lowest baseline rates: pre- vs post-intervention

Targeted Educational Initiative to Improve Injection Practices

- Safe Injection Practices Coalition
  http://www.oneandonlycampaign.org/
One & Only Campaign Materials

- Pilot state campaigns: Nevada, New York
Collaborative and Integrated Approach

- Targeted education
- Alignment of incentives
- Partnerships and collaborations
Promote System-Wide Improvement

- Create sustainable HAI elimination
  - Healthcare payment incentives
  - Oversight and accreditation
- Encourage systems of care that are prevention oriented
- Prevention of HAIs embedded in processes of care
Centers for Medicare and Medicaid Services (CMS)

- October 2008
- **Non-payment rules for “Never events”**
  - Preventable conditions acquired during patient’s hospital stay
  - Includes HAI bloodstream infections, urinary tract infections, and selected surgical site infections
Federal Efforts to Improve Oversight and Enforcement

- Strengthen regulatory and accreditation standards across all healthcare settings
  - Particular focus on infection control
- Collaboration with CMS
  - Expanded incorporation of infection control requirements into conditions for coverage and inspection procedures
    - Hemodialysis
    - Ambulatory surgical centers
## ASC Infection Control Survey Tool

### PART 2 – INFECTION CONTROL & RELATED PRACTICES

#### Instructions:

- Circle the applicable response, as well as information on the manner in which information was obtained.

- Unless otherwise indicated, a “No” response to any question below must be cited as a deficient practice in relation to 42 CFR 416.51(a).

- If N/A is circled, please explain why there is no associated observation, or why the question is not applicable.

<table>
<thead>
<tr>
<th>I. Hand Hygiene</th>
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</table>

#### Additional Instructions:

- Observations are to focus on staff directly involved in patient care (e.g., physicians, nurses, CRNAs, etc.). Hand hygiene should be observed not only during treatment but also while making other observations in the ASC throughout the survey. Provide additional evidence for what the surveyor has observed, but...
State Efforts to Improve Oversight and Enforcement

- Periodic infection control training requirements for licensed healthcare providers (NY)
- Requirement for outpatient endoscopy and surgical centers to retain a licensed Infection Preventionist (NJ)
- Increased licensing, accreditation, and/or inspection requirements for physician offices and clinics based on levels of anesthesia or sedation provided (NY, NV)
Collaborative and Integrated Approach

- Targeted education
- Alignment of incentives
- Partnerships and collaborations
Importance of Teamwork

- Collaboration across all healthcare personnel groups
- Each person has role in HAI prevention
- Empowered to promote patient safety
  - Success of positive deviance programs

“Collaboration rather than competition should be the hallmark of elimination efforts.”

Pronovost P. HICPAC November 2009.
Increasing Needs and Opportunities for Partnerships Across the Continuum of Care

- Acute Care Facility
- Home Care
- State Health Departments
- Long Term Care Facility
- Outpatient/Ambulatory Facility
Regional Approach May be the Key

- Emergence of VRE in acute care facilities and LTCF in Siouxland region
- Collaboration among health departments and all 32 facilities controlled VRE outbreak

A New Model for Prevention: Prevention Collaboratives

- Gold standard in HAI prevention
- Group of healthcare facilities engaged in a common effort to reduce HAIs
- Members use a common strategy
- Discuss progress regularly and share lessons learned in real time
Strengths of a Prevention Collaborative

- Opportunities to share experiences on what works and does not work
- Ability to get advice from others who are working on the same project
- Peer pressure is also a motivator
- Regional prevention collaborative is key in preventing MDRO transmission
What’s the Minimum Size of a Prevention Collaborative?

- 2 or more facilities working together meaningfully
- Ideal size depends on multiple factors
  - Specific subject or targeted HAI
  - Type of healthcare facilities
  - Available resources
  - More “cutting edge” — smaller number
  - More established “change packages” can be quite large
  - Level of enthusiasm
Lessons Learned from Pittsburgh and Michigan

- Successful collaboration among participating hospitals with varying ICU types
- Prevention practices utilized during these interventions were not novel
- Practical implementation strategies identified that can be successful across many facilities
Common Elements for Successful Infection Prevention

- Simple
- Patient-centered, integrated with care
- Evidence-based recommendations
- Part of a “package” for prevention
- Engaging and empowering providers
- Protocols and systems in place
- Standardized ways for recording information about infections (e.g., NHSN)
- Regular feedback of information to providers
- Changing to a pro-safety culture
- Leadership support

State-Based HAI Prevention Collaboratives

- ARRA funded collaboratives (fully or in part) – July 2010
- 39 states, 45 collaboratives
  - CLABSI (n=14)
  - CAUTI (n=5)
  - MRSA (n=9)
  - SSI (n=6)
- Vermont: MDRO prevention collaborative involving all acute care facilities + LTCFs
ADDRESSING GAPS IN KNOWLEDGE
Improving HAI Surveillance

- Provide accurate and timely data to assess HAI risks and impact of prevention strategies
- Continue refining and developing new standard definitions and surveillance methods
  - Capture nonhospital HAIs
- Identify less-labor intensive method
  - Algorithmic detection of HAIs
  - Capture through electronic health information records
Building Capacity for Outbreak Response

- Investigations of HAIs or adverse events in various healthcare settings

- Why we care so much about outbreaks
  - Major detriment to patient care and safety
  - Possible massive financial and public health impacts (e.g. undermine preventive care)
  - Sentinel events and can play a major role in making recommendations that improve overall patient care
  - Provide important opportunities for education
Continuing Prevention Research

- Develop effective prevention strategies
  - Particularly non-ICU and nonhospital settings
- Enhance understanding of the epidemiology of certain HAI pathogens
- Identify strategies for improving adherence
Infection Prevention is Everyone’s Responsibility!
Thank you

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333
Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov      Web: www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.