Top 10 “Must Do’s” for the Elimination of Healthcare-Associated Infection
Dr. William Jarvis, Jason & Jarvis Associates
Teleclass broadcast sponsored by GOJO (www.gojo.com)

Top 10 “Must-Do’s” for The Elimination of Healthcare-Associated Infections
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Hosted by Anne Bialachowski
St. Joseph’s Healthcare
Hamilton, Ontario, Canada

Disclosure
• “To do’s” selected on the basis of scientific evidence and what I would want done on me.

• I consult for Becton-Dickinson, Carefusion, Kimberly-Clark, GOJO, Johnson and Johnson, Medscape, APIC and CDC.

#1-To Do—SURVEILLANCE

• Conduct active, prospective surveillance for healthcare-associated infections (HAIs).

#1-To Do—SURVEILLANCE

• Without measurement (surveillance), one does not know what your HAI rate is or if prevention or control measures are effective.

• Calculate standardized incidence rates (i.e., central line-associated bloodstream infections [CLA-BSIs], catheter-associated urinary tract infections [CA-UTIs], ventilator-associated pneumonia [VAP] in intensive care unit patients, surgical site infections [SSIs], etc.):
  – standardized definitions.
  – standardized surveillance protocols.
  – appropriate risk adjustment.
  – appropriate denominators for rate calculation.

Estimated Annual Number, Hospital Cost, and Mortality of HAI by Site of Infection

- Surgical Site Infection
  - Total infections: 200,485
  - Hospital Cost per infection (2002 $): $25,546
  - Total Annual Cost ($ in millions): 7,421
  - Death per Year: 15,088

- Central Line-Associated Bloodstream Infection
  - Total infections: 248,678
  - Hospital Cost per infection (2002 $): $16,451
  - Total Annual Cost ($ in millions): 9,062
  - Death per Year: 30,665

- Ventilator-Associated Pneumonia
  - Total infections: 250,205
  - Hospital Cost per infection (2002 $): $19,969
  - Total Annual Cost ($ in millions): 2,494
  - Death per Year: 35,987

- Catheter-Associated Urinary Tract Infection
  - Total infections: 561,667
  - Hospital Cost per infection (2002 $): $1,006
  - Total Annual Cost ($ in millions): 585
  - Death per Year: 8,205

http://www.cdc.gov/NHSN

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A Good Role Model or Starting Point

CDC’s NHSN Patient Safety Component Modules

- CLABSI
- VAP
- CAUTI
- DE
- SSI
- CLIP
- PPP
- AUR
- MDRO/CDAD
- Lab ID
- Processes
- Method A
- Method B

#2-To Do--An Insertion Bundle for Prevention of Central Line-Associated Bloodstream Infections (CLA-BSIs)

- Only insert catheters if necessary.
- Use a catheter insertion checklist (to monitor processes).
- Hand hygiene—before catheter insertion.
- Use a catheter insertion/dressing change kit or cart.
- >0.5% Chlorhexidine (CHG) with alcohol for skin antisepsis
- Maximal barrier precautions (cap, mask, gown, gloves, full body drape).
- Vessel preservation-correct catheter at the correct site—avoid femoral.
- Remove catheters as soon as possible.

#3-To Do--A Maintenance Bundle for Prevention of Central Line-Associated Bloodstream Infections (CLA-BSIs)

- Use the safest needleless connector.
- Scrub the hub of the connector with CHG or alcohol for ≥15 seconds with each manipulation.
- Use the CHG-impregnated sponge disk (BioPatch).
- Daily CHG baths for medical intensive care unit patients.
- Use antiseptic or antimicrobial impregnated catheters (if catheter in for ≥5 days).
- Maintain lumen patency.
- Keep dressing dry and intact.
- Remove lines when no longer medically needed.
- Use antimicrobial/antiseptic locks.

Pre-Keystone--JHU SICU CLA-BSI Intervention
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Keystone Project
- Study design: Intervention cohort study in 108 Michigan intensive care units (ICUs) over 18 months.
  Comparison of CVC-BSI rates before, during, and after intervention.
- Results: 103 ICUs, 1,981 months of ICU data and 375,757 catheter-days.

Median CVC-BSI Rates per 1,000 CVC-days

Conclusion: An evidence-based intervention resulted in a large and sustainable decrease (up to 66%) in CVC-BSI rates that was maintained for 18 months.

Successful State CLA-BSI Collaborative, New York City, 2005-2007

<table>
<thead>
<tr>
<th>Year</th>
<th>ICU CLABSI Infection Rates for Hospitals Participating in the NYHA/DEF CLABSI Collaborative, New 2005-2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control line infections per 1,000 central line days</td>
</tr>
<tr>
<td>2005</td>
<td>4.26</td>
</tr>
<tr>
<td>2006</td>
<td>4.36</td>
</tr>
<tr>
<td>2007</td>
<td>4.59</td>
</tr>
</tbody>
</table>

Conclusion: An evidence-based intervention resulted in a large and sustainable decrease (up to 66%) in CVC-BSI rates that was maintained for 18 months.

Hospitals Participating in NHSN are Preventing MRSA Bloodstream Infections

<table>
<thead>
<tr>
<th>Year</th>
<th>Pooled Mean Annual CLABSI Rate per 1,000 Central Line Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>0.11</td>
</tr>
<tr>
<td>1998</td>
<td>0.12</td>
</tr>
<tr>
<td>1999</td>
<td>0.13</td>
</tr>
<tr>
<td>2000</td>
<td>0.14</td>
</tr>
<tr>
<td>2001</td>
<td>0.15</td>
</tr>
<tr>
<td>2002</td>
<td>0.16</td>
</tr>
<tr>
<td>2003</td>
<td>0.17</td>
</tr>
<tr>
<td>2004</td>
<td>0.18</td>
</tr>
<tr>
<td>2005</td>
<td>0.19</td>
</tr>
<tr>
<td>2006</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Conclusion: An evidence-based intervention resulted in a large and sustainable decrease (up to 66%) in CVC-BSI rates that was maintained for 18 months.

TABLE 2. Estimated annual number of central line-associated bloodstream infections (CLABSI), by health-care setting and year — United States, 2001, 2006, and 2009

<table>
<thead>
<tr>
<th>Health-care setting</th>
<th>Year</th>
<th>No. of infections (upper and lower bound of sensitivity analysis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive-care units</td>
<td>2001</td>
<td>45,000 (27,000-67,000)</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>16,000 (12,000-28,000)</td>
</tr>
<tr>
<td>Inpatient wards</td>
<td>2008</td>
<td>23,000 (15,000-37,000)</td>
</tr>
<tr>
<td>Outpatient hemodialysis*</td>
<td>2008</td>
<td>37,000 (23,000-57,000)</td>
</tr>
</tbody>
</table>

*Case definitions approximate current definition of CLABSI according to the National Healthcare Safety Network.
CDC MMWR 2011;60:1-6.

#4-To Do: Surgical Site Infection (SSI) Bundle

1. Administer the prophylactic antibiotic within 30-60 minutes (not 0-30 minutes) before the surgical incision.
2. Administer the correct prophylactic antibiotic for the surgical procedure (increase dose in obese; re-dose for procedures >3 hours).
3. Discontinue the prophylactic antibiotic(s) within 24 hours after surgery end time (48 hours for cardiac surgery).
4. Maintain appropriate peri-operative glucose control (esp. cardiac).
5. Do not shave hair (clip, if necessary).
7. Minimize the number and movement of OR personnel.
8. Insure appropriate skin antisepsis.
9. Screen patients for S. aureus (MRSA/MSSA) and decolonize (CHG, mupiricin).

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Surgical Infection Prevention Project (SIPP):
National Performance – 4th Quarter, 2003

1. Insert catheters only for appropriate indications.
2. Leave catheters in place only as long as needed.
3. Ensure that only properly trained persons insert and maintain catheters.
4. Insert catheters using aseptic technique and sterile equipment.
5. Maintain a closed drainage system.
7. Use of antimicrobial/antiseptic-impregnated catheters.
8. Consider physician reminders and automatic stop orders.
9. Consider alternatives to indwelling urinary catheterization.
10. Use portable ultrasound devices to assess urine volume to reduce unnecessary catheterizations.

#6 To Do--The Ventilator-Associated Pneumonia (VAP) Prevention Bundle
1. Avoid endotracheal intubation, if possible.
2. Use of oral, rather than nasal, endotracheal tubes.
3. Hand hygiene before and after patient contact.
4. All patients assessed daily for weaning and extubation.
5. Minimizing duration/intensity of sedation and device exposure.
6. Avoid supine position, aim for at least 30° head up.
7. Use Chlorhexidine for daily mouth care.
8. Use subglottic secretion drainage in patients likely to be ventilated >48 hours.
10. Use of sterile water for irrigation.
11. Minimize the duration of mechanical ventilation.
12. Promote tracheostomy when ventilation is needed for a longer term.

#7 To Do-Environmental Cleaning and Decontamination
- Educate environmental services personnel (ESP) about their critical role in HAI prevention.
- Educate ESP about recommended cleaning practices and the importance of following hospital cleaning policies.
- Develop policies on which patient-care equipment and environmental surfaces are to be cleaned by ESP and by nursing staff.
- Ensure compliance by ESP with cleaning and disinfection procedures (Checklist, monitoring).
- Consider enhanced methods for terminal cleaning of rooms.

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#8 To Do--Hand Hygiene
1. System change.
2. Education of healthcare workers.
3. Alcohol-based hand rubs/gels/foams
4. Proper dispenser placement
5. Monitoring and feedback of performance (Is visual monitoring sufficient?).
6. Administrative support (IP monitoring; Managers/administrators/unit leaders enforce).
7. Leadership and culture change.

“5 Moments for Hand Hygiene”

How to Clean
– Doing it right
Is important!

Where to Clean?

#9 To Do--Antimicrobial Stewardship
12 Steps to Prevent Antimicrobial Resistance: Hospitalized Adults
1. Break the chain
2. Isolate the pathogen
3. Treat infection, not colonization
4. Use local data
5. Practice antimicrobial control
6. Access the experts
7. Get the catheters out
8. Prevent Transmission
9. Use Antimicrobials Wisely
10. Diagnose & Treat Effectively
11. Prevent Infections

#10 To Do--MRSA Prevention and Control
1. Risk assessment to identify high risk patients.
2. Active surveillance testing of identified high-risk or all patients to identify the reservoir for spread.
3. Barrier precautions for known or suspected MRSA-colonized or -infected patients.
5. Decolonization or suppression of colonized patients (esp. in surgical patients).
6. Antibiotic Stewardship.

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Nationwide Rates of Health Care–Associated Infections with MRSA in Veterans Affairs (VA) Facilities.


Nationwide Quarterly Rates of Health Care–Associated Infection with MRSA in Veterans Affairs Facilities, by Type of Infection.


Nationwide Monthly Rates of Ventilator-Associated Pneumonias and Central Venous Catheter–Associated Bloodstream Infections with MRSA in Veterans Affairs Intensive Care Units.


Healthcare–Associated Invasive MRSA Infections, 2005-2008

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), %</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All invasive MRSA infections</td>
<td>-5.4 (-14.7 to 3.8)</td>
<td>.065</td>
</tr>
<tr>
<td>Hospital-acquired</td>
<td>-5.7 (-9.7 to -1.6)</td>
<td>.006</td>
</tr>
<tr>
<td>Community-acquired</td>
<td>-1.3 (-2.5 to 0.7)</td>
<td>.178</td>
</tr>
<tr>
<td>MRSA bloodstream infections</td>
<td>-11.2 (-15.5 to -6.3)</td>
<td>.001</td>
</tr>
<tr>
<td>Hospital-acquired</td>
<td>-11.4 (-14.5 to -8.2)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Community-acquired</td>
<td>-5.2 (-8.3 to 0.1)</td>
<td>.053</td>
</tr>
<tr>
<td>Deaths in last year</td>
<td>-7.3 (-9.7 to -4.5)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>No deaths in last year</td>
<td>-5.3 (-11.4 to -0.28)</td>
<td>.026</td>
</tr>
</tbody>
</table>

*Modelled models adjusted for age and race unless otherwise specified.


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Conclusions

- By implementing these evidence-based interventions, a large proportion of HAIs can be prevented.
- Bundles of interventions (rather than just one) have been shown to be effective in reducing HAIs.
- We are entering a new era where Zero Tolerance for HAIs will be expected.
- Infection control is everybody’s business, but we in infection control should lead the way.

Thank you

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26 July (Free Teleclass) Pneumonia Prevention – The Vent And Beyond
Speaker: Kathleen M. Vollman, Advancing Nursing LLC
Teleclass sponsored by Sage Products Inc (www.sageproducts.com)

15 August (Free WHO Teleclass — Europe) Processing Medical Devices in Settings With Limited Resources
Speaker: Dr. Nizam Damani, Craigavon Area Hospital, Northern Ireland
Sponsored by WHO First Global Patient Safety Challenge – Clean Care is Safer Care

30 August (Free Teleclass —Broadcast live from New Zealand NCICN Conference) ‘Contagion’ ... the Movie, How Realistic Is It?
Speaker: Prof. Lance Jennings, University of Otago, New Zealand

5 September (Free WHO Teleclass — North America) Successes and Challenges in Developing and Implementing Bundles in Infection Prevention
Speaker: Prof. Don Goldmann, Harvard University School of Public Health
Sponsored by WHO First Global Patient Safety Challenge – Clean Care is Safer Care

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