Linking Infection Control and Product Evaluation
Robert Garcia, Brookdale University Medical Center
A Webber Training Teleclass

Robert Garcia, MMT(ASCP), CIC
Brookdale University Medical Center

Hosted by Maria Bennallick
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Products, Products Everywhere

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Why Evaluate Products?

- Emphasis on controlling healthcare costs
- Cost efficient medical care by consumers
- Increasing supply costs
- Patient safety
- Managed care and capitation limit reimbursement for billed expenses
- Nosocomial infections
- Liability
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Medical Device and Infections:
CVC Benchmark Rates for ICU, NNIS, Jan 2002-Jun 2004

<table>
<thead>
<tr>
<th>Age of ICU</th>
<th>No. of units</th>
<th>Central line rate</th>
<th>Pected rate</th>
<th>75%</th>
<th>85%</th>
<th>95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis</td>
<td>68</td>
<td>168</td>
<td>12</td>
<td>10</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>67</td>
<td>185</td>
<td>12</td>
<td>10</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Septicemia</td>
<td>59</td>
<td>175</td>
<td>12</td>
<td>10</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>N. septic</td>
<td>13</td>
<td>43</td>
<td>12</td>
<td>10</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>GI</td>
<td>13</td>
<td>43</td>
<td>12</td>
<td>10</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Respiratory</td>
<td>6</td>
<td>13</td>
<td>12</td>
<td>10</td>
<td>15</td>
<td>13</td>
</tr>
</tbody>
</table>


Guidelines & Medical Devices: Use and Replacement Issues

• “Observe proper hand-hygiene procedures either by washing hands with conventional antiseptic-containing soap and water or with waterless alcohol-based gels or foams…”
• “Disinfect skin with an appropriate antiseptic...2% chlorhexidine…”
• “Use either sterile gauze or sterile transparent, semi-permeable dressing…”
• “In adults, replace short, peripheral venous catheters at least 72-96 hours to reduce risk of phlebitis…”
• “Use aseptic technique including the use of a cap, mask, sterile gown, sterile gloves, and a large sterile sheet for the insertion of CVC (including PICCs)…”

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Guidelines & Medical Devices: Use and Replacement Issues (cont’d)

- “Do not change routinely, on the basis of duration of use, the breathing circuit…that is in use on a patient…”
- “Do not routinely change more frequently than every 48 hours an HME that is in use on a patient…”
- No recommendation can be made about the frequency of routinely changing in-line suction catheter of a closed-suction system in use on one patient…
- “…develop and implement a comprehensive oral-hygiene program…for patients…at high risk for…pneumonia…”
- “Require patients to shower or bathe with an antiseptic agent on at least the night before the operative day…”
- “Use an appropriate antiseptic agent for skin preparation…”
- “Perform a preoperative surgical scrub for at least 2 to 5 minutes using an appropriate antiseptic…”
- “Wear a surgical mask…; “Wear a cap or hood…”; “Wear sterile gloves…”; “Use surgical gowns and drapes that are effective barriers when wet…”

Products & Infection

- It is estimated that greater than >50% of all products reviewed at Products Evaluation Committees have a related infection control issue
- In general, infection control-related products deal with
  - creating barriers against, killing, or preventing organisms from entering a body site
  - products used for sterility assurance
  - devices used to administer medications and fluids or to collect or transfer blood or body fluids

FDA Definition of a Medical Device

- “A medical device is an instrument, apparatus, implement, machine, contrivance, implant, in vitro reagent, or other similar or related article, including a component part, or accessory which is:
  - recognized in the official National Formulary, or the United States Pharmacopoeia, or any supplement to them,
  - intended for use in the diagnosis of disease or other conditions, or in the cure, mitigation, treatment, or prevention of disease, in man or other animals, or
  - intended to affect the structure or any function of the body of man or other animals, and which does not achieve any of its primary intended purposes through chemical action within or on the body of man or other animals and which is not dependent upon being metabolized for the achievement of any of its primary intended purposes.”
Is the Medical Device Regulated?

- Certain medical devices require review by the Food and Drug Administration (FDA)
- In general, a device to be used on a person in a healthcare setting must have an initial manufacturer filing and a 510(k) pre-market notification
- The vendor should provide clear documentation that this has been obtained

http://www.fda.gov/cdrh/devadvice/

What is Product Evaluation?

- “the process of appraisal that considers the value and significance of quality, cost, safety, and practitioner choice for product selection”


What Criteria is PE based on?

- *Quality* refers to the extent which the product performs its defined function
- *Efficacy* refers to how effectively the product meets its specified function
- *Safety* refers to a level of risk avoidance
- *Cost* is not price
- *Serviceability* refers to the ease of use and maintenance, user acceptability, durability
Systematic product review and value analysis: Basic Questions

• Will the product improve the satisfaction of the patient or the product user?
• Will the treatment outcome of the patient be changed by using the product?
• Will the product alter practice or have an impact on clinical decisions related to patient care?

More on Value Analysis...

• Good value analysis requires accurate estimates of total costs, including not only purchase price, but cost of labor, utilities, maintenance, etc.
• If a product is more expensive than one currently used, value analysis assists in determining the incremental cost of the product vs. the expected benefit to the patient
• Focuses on procedures rather than products
Product Standardization

- Eliminates duplication
- Reduces inventory
- Sets and encourages a procedure standard
- Reduces educational needs for the staff
- Results in enhanced patient safety (if decision process is ideal)

Product Evaluation Committee

- Multidisciplinary
- Reports to administration
- Establishes subcommittees
- Monthly meetings to ensure timeliness
- Establish timelines

Multidisciplinary

- Administration
- Purchasing/Materials Management
- Finance
- Nursing
- Education
- Infection Control
- Operating room
- Emergency Room
- Pediatrics
- Central services
- Respiratory Therapy
- Biomedical
- Physicians
- *End users, End users*
Handout:
A Recommended Step-by-Step Protocol for Evaluating Infection Control-Related Products

Steps in Product Evaluation

- Step 1: Products are requested to be reviewed by the PEC
- Step 2: Role of Materials Management & Infection Control
- Step 3: Materials Management presents findings to PEC; PEC members review clinical details of product
- Step 4: Determine outcomes of initial screening
- Step 5: Trial of product is conducted
- Step 6: Results of Evaluation are reported to the PEC
- Step 7: PEC approves product for use

Key Contribution by IC: Regulatory Review

- OSHA
- AORN
- EPA
- FDA
- HICPAC (CDC)
- APIC
- JCAHO
- AAMI
- AIA
- INS
- AHCS
- AHCSP
- State & local govt.

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Key Contribution by IC: Review of Supportive Science

- Published data
- Best practice
- Policy & procedure
- Experiences
- Practices of colleagues
- Outcome data

Issues and Insights to Consider in Products and Services

The Practice Arena of Interventional Epidemiologists

Clinical

Financial

Customer Satisfaction

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Handwashing Products or System?

- **Education**
- **Medicated lotion soap**
- **HICPAC Guidelines**
- **Monitoring**

Photographs courtesy of Steris, Inc.

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HICPAC Recommendations: Performance Indicators

- “Periodically monitor and record adherence as the number of hand-hygiene episodes performed by personnel/number of hand-hygiene opportunities, by ward or service. Provide feedback to personnel regarding their performance.”

- “Monitor the volume of alcohol-based hand rub (or detergent used for handwashing or hand antisepsis) used per 1,000 patient-days.”


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Value-Added Programs

- Provide an additional resource which benefits institution, e.g. regulatory compliance
- Steris **Partners in Your Care** program
  - Empowers patient not employee
  - Aim is to change behavior in employee
  - Study indicates increase in handwashing of 34% \(^1\)
  - Facility provides handwashing soap and alcohol based sanitizer usage data and patient days; Univ. of Pennsylvania calculates usage.

Don’t be shy!
Your healthcare workers are concerned about you and want to know how their hands look.

“Did you wash / sanitize your hands?”

Facts About Hand Hygiene...
- Hand hygiene is one of the most important procedures that is performed in the hospital setting.
- Germs can be spread to others in a number of ways. The most common is through hands.
- Hand hygiene reduces the potential for infection in others.
- And it’s the most important thing you can do to protect yourself.

PARTNERS IN YOUR CARE
Program

Hospital Name

SAMPLE
Medical Center
June 1 – December 31, 2004
Location 4 South

Chlorhexidine Skin Antisepsis

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Results of Trial of Three Antiseptics

<table>
<thead>
<tr>
<th>Source of Septicemia</th>
<th>10% Povidone-Iodine (n = 227)</th>
<th>70% Alcohol (n = 227)</th>
<th>2% CHG (n = 214)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catheter-related</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Contaminated:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infusate</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Hub</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All sources (%)</td>
<td>7 (3.1)</td>
<td>6 (2.6)</td>
<td>1 (0.5)*</td>
</tr>
</tbody>
</table>

668 patients with either central venous or arterial catheters.

*Compared with the other two groups combined: OR=0.16, 95% CI 0.30-1.17, p=.04


Meta-Analysis on CHG vs. PI

- Reviewed eight randomized, controlled trials involving a total of 4,143 catheters (peripheral venous, peripheral arterial, pulmonary arterial, PICC, introducer sheaths, hemodialysis).

- The summary risk ratio for CRBSI for all catheters was 0.49 indicating "a significantly reduced risk in patients using chlorhexidine gluconate."


CHG Standardization

BUMC converted 7 povidone-iodine products (solution, swabs, wipes, etc.) to 2 70% alcohol-2% chlorhexidine products.
Blood Culture Skin Prep

- CHG has been equated with PI with low rates of blood culture contamination
- Study whereby BCs were drawn by MDs and phlebotomists
  - CHG rate: 0.5%
  - PI rate: 1.4%

Trautner BW, et al. Skin antisepsis kits containing alcohol and chlorhexidine gluconate or tincture of iodine are associated with low rates of blood culture contamination. ICHE 2002;23:397-401.

Chlorhexidine-impregnated Patch

Photograph courtesy of Johnson & Johnson

Is a CHG Patch Effective?

- Bacterial inhibition
  - Study to assess the activity of CHG foam against primary organisms, including antibiotic-resistant, causing intravascular-related infections
  - Zones of inhibition were observed for all test organisms including MRSA, VRE, Candida, and P. aeruginosa.
- Preventing Bacteremia
  - Controlled, randomized, multi-center trial
  - 24 CRBSIs in 736 pts in control group
  - 8 CRBSIs in 665 pts Biopatch group
  - Conclusion: significant reduction using CHG-impregnated patch (RR 0.38)


Is a CHG Patch Cost Beneficial?

- Analysis comparing the costs with benefits of using a CHG-impregnated sponge on CVCs to determine effectiveness of reducing BSI, costs, mortality
- Decision model assuming sponge cost of $7.50, BSI cost of $8,000 - $25,000, sponge effectiveness of 60%, and mortality of 1 - 5%
- Results:
  - Avoided costs per pt.: $237.76 - $964.86
  - Avoided costs, nationally: $275m – $1.97b
  - Decreases in mortality: 329-3,906 patients per year

Sterile Barriers: Economic Incentives

- Cost-effectiveness analysis using a decision model
- Calculated total direct medical costs and incidences of CR-BSI
- Results:
  - Lowered costs from $621 to $369 per catheter
  - Lowered CR-BSI from 5.3% to 2.8%
  - Lowered death from 0.8% to 0.4%

Does the Dressing Matter?

<table>
<thead>
<tr>
<th>Prod.</th>
<th># Ps.</th>
<th>LD</th>
<th>Obser. Days</th>
<th># Dressings Peeled</th>
<th>% peeled</th>
<th># CRBSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>120</td>
<td>1227</td>
<td>345</td>
<td>180</td>
<td>52.2</td>
<td>6</td>
</tr>
<tr>
<td>B</td>
<td>117</td>
<td>1220</td>
<td>338</td>
<td>44</td>
<td>13.0</td>
<td>2</td>
</tr>
</tbody>
</table>

Study conducted at Brookdale University Medical Center; Population included adult patients with a central venous catheter; Product A & B are both transparent dressings; Similar percent by site in both groups (femoral, subclavian, jugular); Observations of site conducted on days 1,3,5 after application; dressing policy – replace as needed; unpublished data.

Dressings that better conform to a patient’s anatomy; photo courtesy of Tri-State Hospital Supply, Inc.

Needleless IV Connectors

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Positive Displacement Valves

Figures courtesy of Baxter Healthcare, Inc.

Needleless IV Connectors: In Vitro Studies
Indicating No Increased Contamination


Needleless IV Connectors: In Vivo Studies
Indicating No Increased Contamination or Infection

Reports of Possible Contamination or Infection with Use of Needleless Injection Caps


Most reports indicate a lack of compliance with proper disinfection of connector ports in central venous catheter lines in use for >7 days.

Antiseptic-Barrier Cap

Photograph courtesy of Mehyhay Medical, Inc.
### Is it Effective?

<table>
<thead>
<tr>
<th>Description</th>
<th>No. needleless hubs studied</th>
<th>No. showing microbial transmission across the membrane</th>
<th>No. CFU traversing the membrane, range</th>
<th>p = 0.001</th>
</tr>
</thead>
<tbody>
<tr>
<td>No disinfection (positive controls)</td>
<td>15</td>
<td>15 (100%)</td>
<td>4,500-28,000</td>
<td></td>
</tr>
<tr>
<td>Conventional disinfection with 70% alcohol</td>
<td>30</td>
<td>20 (67%)</td>
<td>445-25,000</td>
<td></td>
</tr>
<tr>
<td>Antiseptic-barrier cap</td>
<td>60</td>
<td>1 (1.6%)</td>
<td>0-350</td>
<td></td>
</tr>
</tbody>
</table>


### Incremental Cost of New Interventions

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Incremental cost per item</th>
<th># items used in 10 days</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximal sterile barrier kit</td>
<td>Sterile gown, gloves, mask, large drape, dressing components</td>
<td>$7.00</td>
<td>2</td>
<td>$14.00</td>
</tr>
<tr>
<td>Dressing kit</td>
<td>Transparent dressing, 2% CHG antiseptic, tincture of benzoin, tape</td>
<td>$2.00</td>
<td>1</td>
<td>$2.00</td>
</tr>
<tr>
<td>Skin antiseptic</td>
<td>70% alcohol-2% CHG in 3ml applicator</td>
<td>$0.70</td>
<td>2</td>
<td>$1.40</td>
</tr>
<tr>
<td>Antiseptic patch</td>
<td>Chlorhexidine-impregnated patch</td>
<td>$5.00</td>
<td>2</td>
<td>$10.00</td>
</tr>
<tr>
<td>Antimicrobial catheter</td>
<td>Silver-platinum catheter</td>
<td>$10.00</td>
<td>2</td>
<td>$20.00</td>
</tr>
</tbody>
</table>

Total incremental cost per patient: $47.40

### Avoided Costs in CRBSI Prevention

<table>
<thead>
<tr>
<th>Infection type</th>
<th>Total attributable infection cost</th>
<th># infections avoided</th>
<th>Total avoided infection cost</th>
<th>Incremental intervention cost</th>
<th>Total avoided costs</th>
<th># Times infection costs greater than intervention costs (C/F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>$4,912,796</td>
<td>1</td>
<td>$4,912,796</td>
<td>$39,816</td>
<td>$5,312,612</td>
<td>13.31</td>
</tr>
<tr>
<td>9%</td>
<td>$4,429,512</td>
<td>1</td>
<td>$4,429,512</td>
<td>$39,816</td>
<td>$4,829,328</td>
<td>12.13</td>
</tr>
<tr>
<td>8%</td>
<td>$3,946,228</td>
<td>1</td>
<td>$3,946,228</td>
<td>$39,816</td>
<td>$4,346,044</td>
<td>11.92</td>
</tr>
<tr>
<td>7%</td>
<td>$3,463,044</td>
<td>1</td>
<td>$3,463,044</td>
<td>$39,816</td>
<td>$3,863,860</td>
<td>11.72</td>
</tr>
<tr>
<td>6%</td>
<td>$2,980,859</td>
<td>1</td>
<td>$2,980,859</td>
<td>$39,816</td>
<td>$3,380,675</td>
<td>11.52</td>
</tr>
<tr>
<td>5%</td>
<td>$2,498,675</td>
<td>1</td>
<td>$2,498,675</td>
<td>$39,816</td>
<td>$2,918,490</td>
<td>11.32</td>
</tr>
<tr>
<td>4%</td>
<td>$2,016,490</td>
<td>1</td>
<td>$2,016,490</td>
<td>$39,816</td>
<td>$2,448,305</td>
<td>11.12</td>
</tr>
<tr>
<td>3%</td>
<td>$1,534,306</td>
<td>1</td>
<td>$1,534,306</td>
<td>$39,816</td>
<td>$1,974,121</td>
<td>10.92</td>
</tr>
<tr>
<td>2%</td>
<td>$1,052,121</td>
<td>1</td>
<td>$1,052,121</td>
<td>$39,816</td>
<td>$1,483,936</td>
<td>10.72</td>
</tr>
<tr>
<td>1%</td>
<td>$570,937</td>
<td>1</td>
<td>$570,937</td>
<td>$39,816</td>
<td>$520,753</td>
<td>10.52</td>
</tr>
</tbody>
</table>

Total avoided costs: $3,801,336

Mean attributable cost per CRBSI (CDC): $45,254

Total annual Intervention cost: $39,816
Safety Sharps Selection Criteria

- Should minimize or eliminate the risk of a needlestick or other sharps injury to the user during and after use, and during and after disposal
- Should have a reliable safety mechanism that clearly indicates when the mechanism is activated and remains closed even if exposed to reasonable force
- The safety mechanism should be integral to the device.
- Activation preference in order: automatic, one-handed, two-handed
- Preferred that safety mechanism activates before removal from patient

Safety Sharps

- …and….
  - On the current trends and assessment of needlesticks in your institution
  - Example: does the lack of ease of use contribute to an increase in needlesticks in that device category?
Needlesticks during use of insulin syringes, BUMC

<table>
<thead>
<tr>
<th>Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>1st qtr 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Note: Product A used Jan 2001-Sept 2004; Product B used Oct 2004- March 2005; only 2 needlesticks since conversion to new insulin syringe

---

Evaluation Results (Final Criteria), Needles & Syringes

I would recommend that this product be purchased by the facility

<table>
<thead>
<tr>
<th>Trait</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree or disagree</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yshc</td>
<td>29</td>
<td>0</td>
<td>2</td>
<td>8</td>
<td>19</td>
<td>58</td>
</tr>
<tr>
<td>Yshn</td>
<td>25</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td>CCU</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>Sprt</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>11</td>
<td>30</td>
</tr>
<tr>
<td>SICU</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>13</td>
<td>29</td>
</tr>
<tr>
<td>NICU</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>NSICU</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Sins</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>20</td>
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<tr>
<td>Peds</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>13</td>
<td>30</td>
</tr>
<tr>
<td>LAB</td>
<td>14</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>27</td>
</tr>
<tr>
<td>MBU</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>NICU</td>
<td>22</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>9</td>
<td>32</td>
</tr>
<tr>
<td>OR</td>
<td>28</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>ED</td>
<td>33</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>277</td>
<td>0</td>
<td>3</td>
<td>16</td>
<td>101</td>
<td>157</td>
</tr>
<tr>
<td>Percent</td>
<td>0.0</td>
<td>1.1</td>
<td>5.8</td>
<td>36.5</td>
<td>56.7</td>
<td>100</td>
</tr>
</tbody>
</table>

---

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www.webbertraining.com
Butterfly-related Sharps Injuries, BUMC

<table>
<thead>
<tr>
<th>Year</th>
<th>Prod A</th>
<th>Prod B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>5</td>
<td>10</td>
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<tr>
<td>2004</td>
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</tbody>
</table>

Sharps Evaluation Process

- Provides comparative products
- Objective ratings based on set criteria
- Provides guide for establishing and evaluating a sharps injury program

Hosted by Maria Bennallick  maria@webbertraining.com
www.webbertraining.com
Vial access systems not evaluated

Tyco Kendall Monoject Bluntip Safety IV Access System

Vial Access devices

Not rated

Insyte Autoguard (BD) Peripheral Intravenous catheters

Preferred

Insyte Autoguard (BD) Introducer needles

Not rated

Safe Step, (MDC) Huber needles

Preferred

Outsourcing Sharps Collection

Preferred

Photograph courtesy of Biosystems

Hosted by Maria Bennallick  maria@webbertraining.com
www.webbertraining.com
Benefits of Outsourcing Sharps Collection

• Uniform system throughout facility
• Reduces labor
• Environmentally friendly
• Sanitized containers
• Increases storage space by reducing container storage
• Bar code tracking
• Reduces needlesticks in employees
• Reduces liability

Reducing Sharps Injuries During Disposal Container Collection

Needlestick Injuries, Handling Sharps Container, BUMC, 1987-2004

Preventing VAP: A New Strategy

• Do all of these strategies address a root cause?
  • Replacing vent circuits on a routine basis
  • Use of HME filters
  • Use of closed suction
  • Raising the head of the bed
  • Stress ulcer prophylaxis
  • Selective digestive decontamination
  • Weaning
1. Oral Cavity vs. Gastric Colonization

- Prospective study of 86 mechanically vented ICU patients to assess relationship between oropharyngeal colonization and subsequent occurrence of pneumonia
- Patients oral and gastric specimens were collected on admission and twice weekly
- When pneumonia suspected, bronchoscopic specimens were taken with protected specimen brush
  - In 31 cases of pneumonia identified, DNA genomic analysis demonstrated that oropharyngeal colonization was the predominant factor in the development of pneumonia compared with gastric colonization


Acquired bacterial colonization: Location of the microorganisms in the 44 carrier patients

<table>
<thead>
<tr>
<th>Colonizing microorganisms</th>
<th>Patients with OC</th>
<th>Patients with GC</th>
<th>Patients with BC</th>
<th>Colonized patients</th>
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<tbody>
<tr>
<td><em>S. aureus</em></td>
<td>7</td>
<td>0</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td><em>K. Pneumoniae</em></td>
<td>12</td>
<td>0</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Enterobacteriaceae</td>
<td>9</td>
<td>5</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>Pseudomonadaceae</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td><em>S. maltophilia</em></td>
<td>17</td>
<td>0</td>
<td>3</td>
<td>20</td>
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<tr>
<td>Enterococcus sp.</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>4</td>
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<tr>
<td>Total</td>
<td>22</td>
<td>5</td>
<td>17</td>
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Oropharyngeal rather than gastric colonization: further support


2. Decontamination of the Oropharynx

- Prospective, randomized, double-blind study of ICU patients to determine VAP while manipulating oropharyngeal colonization and without influencing gastric or intestinal colonization
- 87 given topical antibiotics (study group), 139 given placebo (control group)

Results:
- VAP in study group: 10%
- VAP in control group: 27%


Additional Studies and Reviews using Antibiotic Pastes or Solutions

3. Oral Decolonization: Use of Chlorhexidine

- Prospective, randomized, double-blind, placebo-controlled trial testing the effectiveness of oral decontamination on nosocomial infection
- 353 pts undergoing coronary bypass surgery
- Used chlorhexidine gluconate (0.12%) as oral rinse to prevent nosocomial infections
- Randomized to receive CHG or placebo
- Results:
  - Overall reduction in nosocomial infections of 65% when using CHG
  - Respiratory infections were reduced 69% in CHG group


4. Link Between Oral Pathogens & Respiratory Infection

- A review article
- 6 articles cited as support for a relationship between poor oral health and respiratory infection
- Bacteria from colonized dental plaque may be aspirated into the lower airway

Scanapieco, FA. Role of oral bacteria in respiratory infection. J Periodontol 1999;70:794-802

5. Dental Plaque as a Bacterial Source of VAP

- Study on dental plaque colonization and ICU nosocomial infs.
- 57 patients studied
- Results:
  - Dental plaque occurred in 40% of pts.
  - Colonization of dental plaque was highly predictive of nosocomial infection
  - Salivary, dental, and tracheal aspirates cultures were closely linked

Additional Evidence Linking Colonized Dental Plaque and Respiratory Infection

VAP Rates, MICU, BUMC, 2001-2004

Pre-intervention Period
Post-intervention Period

VAP per 1000 ventilator days

Closed Suction Devices

Photograph courtesy of C.R. Bard
Closed Suction Catheter Replacement

- Manufacturers: replace at 24 hours
- HICPAC:
  - No recommendation can be made about the frequency of routinely changing the in-line suction catheter of a closed-suction system in use on one patient. (Unresolved issue)

Closed Suction Cost Analysis

<table>
<thead>
<tr>
<th>Product (Endotracheal tube model)</th>
<th>1-day cost</th>
<th>3-day cost</th>
<th>5-day cost</th>
<th>7-day cost</th>
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<tbody>
<tr>
<td>Current</td>
<td>$6.95</td>
<td>$20.85</td>
<td>$34.75</td>
<td>$48.65</td>
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<tr>
<td>Proposed</td>
<td>$7.50</td>
<td>$19.50</td>
<td>$31.50</td>
<td>$43.50</td>
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<tr>
<td>Savings with proposed device</td>
<td>$1.35</td>
<td>$3.25</td>
<td>$5.15</td>
<td></td>
</tr>
</tbody>
</table>

If you use 6,000 units per year with 3-day replacement policy:
Current = $125,100; Proposed = $117,000; SAVINGS PER YEAR = $8,100

Urinary Catheters
Cost of a Catheter-associated UTI

- What are the direct costs of a nosocomial catheter-associated UTI (CAUTI)?
  - Prospective study of 1,497 patients
  - Daily cultures reviewed by author (MD)
  - In 123 CAUTIs, $20,662 in extra lab costs, $35,872 in extra medication costs = avg. of $589 (1998 dollars)
  - However, urine in collection bags has the largest reservoir of multi-antibiotic resistant pathogens


Do Silver Urinary Catheters Reduce UTIs & are they Cost Effective?

- Prospective study in 10 patient care units
- 2 24-month periods; >48,500 catheter days
- Use of silver catheters decreased rate from 6.13 to 2.62/1000 catheter days.
- Cost Analysis (low range):
  - 110 UTIs x $666 (cost of UTI)
  - + 110 UTIs x 0.02 (percent bacteremia) x $2041 (cost of bacteremia)
  - = $64,281 (additional cost of silver catheters)
  - = $13,469


Brushless Surgical Scrubs
Are Brushless Surgical Scrubs the Way to Go?

- Replacement of impregnated surgical scrub brushes with antimicrobial solutions
- *The question is not if the new product is effective, but are we replacing a bad habit?*
- Surgeons in general are meticulous about surgical scrub because it is ingrained in them
- If we change to a similar practice as routine handwash, will we have compliance rates as we do now with routine handwash?
- In the end, does a facility replace or supplement?

Summary

- Every procedure in healthcare involves the use of a product
- If Infection Control is not involved in the decision making process, the decision must be questioned
- A step-by-step process for product evaluation ultimately yields the greatest benefit to the institution
- Always question, never accept that it works for your institution
- *Make it fun!!!*

Thank You for Your Support!

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rgarcia@brookdale.edu
The Next Few Teleclasses

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<tr>
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<td>Antibiotic Prescribing Practices</td>
<td>Dr. Dick Zoutman</td>
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<tr>
<td>May 25</td>
<td>Infection Control in the Cruise Ship Industry</td>
<td>Dr. Robert Wheeler</td>
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<tr>
<td>June 1</td>
<td>Infection Control in Healthcare Construction</td>
<td>Dr. Andrew Steifel</td>
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<td>June 8</td>
<td>Zoonosis from Companion Animals &amp; Pets</td>
<td>Dr. Corrie Brown</td>
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For the full teleclass schedule – www.webbertraining.com