Impact of Body Surface Decolonization on Bacteriuria and Candiduria in a Cluster-Randomized Trial of Intensive Care Units: The REDUCE MRSA Trial

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BACKGROUND
- Bacteriuria commonly precedes urinary tract infection, and is often treated with antibiotics, especially in ICU patients.
- The impact of body decolonization on bacteriuria and candiduria is unknown and could be evaluated in the context of the REDUCE MRSA trial.
- The REDUCE MRSA Trial, a 43 hospital, 74 ICU cluster randomized trial of body surface decolonization vs routine care in ICUs, showed that universal decolonization reduced healthcare associated bloodstream infections.
- The REDUCE MRSA Trial involved 3 randomly assigned arms: Targeted Decolonization: screening, contact precautions and targeted decolonization of MRSA+ patients with 5 days of twice daily mupirocin and 5 days of daily chlorhexidine (CHG) bathing.
- Universal Decolonization: no screening, contact precautions continued for MRSA+ patients, all ICU patients decolonized with 5 days of twice daily mupirocin and daily CHG bathing for the entire ICU stay.

RESULTS

Bacteriuria & Candiduria Rates Reduced in Men

<table>
<thead>
<tr>
<th>Variable</th>
<th>Arm 1</th>
<th>Arm 2</th>
<th>Arm 3</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Bacteriuria</td>
<td>15.4%</td>
<td>10.8%</td>
<td>11.7%</td>
<td>0.002</td>
</tr>
<tr>
<td>High Level Bacteriuria</td>
<td>0.5%</td>
<td>0.2%</td>
<td>0.5%</td>
<td>0.26</td>
</tr>
<tr>
<td>Any Candiduria</td>
<td>2.7%</td>
<td>2.2%</td>
<td>2.6%</td>
<td>0.62</td>
</tr>
<tr>
<td>High Level Candiduria</td>
<td>0.1%</td>
<td>0.0%</td>
<td>0.2%</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Top 3 Uropathogens by Gender

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>All Patients</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>54.3%</td>
<td>45.6%</td>
<td>63.8%</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>18.4%</td>
<td>19.8%</td>
<td>16.9%</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>7.0%</td>
<td>7.9%</td>
<td>6.1%</td>
</tr>
</tbody>
</table>

Hazard Ratios of Outcome Rates

For men, universal decolonization reduced urine colony counts for:

- Bacteriuria, Any Colony Count for the pathogens

For women, overall bacteriuria and candiduria did not decrease in either the targeted or the universal decolonization. This was true for both high level bacteriuria as well as any level of bacteriuria for uropathogens.

CONCLUSIONS

- In a secondary analysis of a large cluster randomized trial, universal decolonization reduced candiduria and all bacteriuria with unpathogenic by 22-37% in men, but not women.
- Anatomic differences may account for the benefit in men, where bathing of external genitalia and cleaning of the proximal urinary catheter is more likely to successfully remove skin and genital flora when compared to women.
- Focus on perineal cleaning and cleaning of catheters is likely key.
- Number needed to treat was 167 to prevent one case of bacteriuria and 302 to prevent a case of candiduria among men. This could be lower in the subset of those with urinary catheters, which we were unable to evaluate.
- Limitations include lack of knowledge of symptomatic disease or urinary catheterization, and lack of evaluation of catheter practices during the trial.

STUDY DESIGN
- Study Design & Population: 3 Arm cluster-randomized clinical trial of 43 hospitals (74 ICUs) belonging to Hospital Corporation of America. Study population includes adult ICU patients.
- Randomization Scheme: Hospitals were randomized, accounting for ICU volume and baseline MRSA prevalence. All adult ICUs in a single hospital were assigned to the same arm. Arms as defined above.
- Baseline Period: Jan 1 – Dec 31, 2009
- Phase II Period: Jan 1 – Apr 1, 2010
- Intervention Period: Apr 8, 2010 - Sep 30, 2011
- Perineal & Urinary Catheter Care: Protocol involved explicit direction to use CHG sponges for perineal cleaning, including reapplication after incontinence clean up. All urinary catheters were to be cleaned with the CHG sponge for the proximal 6 inches of the catheter to the body.
- Outcomes (Secondary Analysis of Trial):
  - High Level Bacteriuria (≥50,000 CFU/ml with any uropathogen)
  - High Level Candiduria (≥50,000 CFU/ml)
  - Any Bacteriuria (any CFU with any uropathogen)
  - Any Candiduria (any CFU with any uropathogen)
- Gender – specific analyses specified a priori
- Analyses: As randomized, adjusted, and overall proportional-hazards models assessed differences in outcome reductions across arms comparing intervention to baseline period accounting for clustering in hospitals

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