VAP is the most frequent nosocomial infection in mechanically ventilated patients. After a period of 2 months, the infection control team recognized the importance of preventing VAP and instituted the ventilator bundle. This additional component to the ventilator bundle resulted in an estimated savings of $320,000 in costs related to VAP.3

### METHODS

#### Implementation of the oral care protocol

- Education of the licensed nursing staff was implemented in April 2008, which included re-education of the importance of the IHI ventilator bundle and various components of the comprehensive oral care protocol.
- In June 2008, the oral care protocol was initiated and compliance was tracked.
  - The oral care protocol consisted of a comprehensive oral care system containing q2 oral cleansing, moisturizing and suctioning, and q2 brushing with chlorhexidine gluconate (CHG).
  - Compliance tracking was done by monitoring the electronic scanning of CHG.

#### Biostatistical methods

- Our primary hypothesis was that there would be a decrease in VAP rates in the intensive care unit (ICU), critical care unit (CCU), and cardiovascular recovery (CVR). The time periods for comparison were November 2007 through May 2008 for the pre-intervention period and June 2008 through May 2009 for the post-intervention period.

#### Sample size

- With data from more than 2000 ICU ventilation days, there were adequate statistical powers to detect the observed absolute differences of greater than 3% in the cumulative VAP rate per 1000 ventilator days at an alpha level of 5% and a beta level of 20%.

### RESULTS

#### VAP Rates Before and After Intervention

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Count (Preperiod)</th>
<th>Test statistic</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU VAP rate</td>
<td>3/752 (4.7)</td>
<td>4.7</td>
<td>0.06</td>
</tr>
<tr>
<td>Before</td>
<td>7/952 (7.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>3/1449 (2.2%)</td>
<td>4.1</td>
<td>0.05</td>
</tr>
<tr>
<td>CCU VAP rate</td>
<td>3/572 (5.6%)</td>
<td>4.7</td>
<td>0.06</td>
</tr>
<tr>
<td>Before</td>
<td>7.4% (7/952)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>2% (3/1499)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVR VAP rate</td>
<td>3/132 (22.7%)</td>
<td>4.7</td>
<td>0.06</td>
</tr>
<tr>
<td>Before</td>
<td>2.2% (3/132)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>0.0% (0/1180)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### TABLE 1. Results of the biostatistical analysis

From before (January) to after (July) the intervention.

It is important to note that the relative reduction is larger from pre-intervention to post-intervention (CHG compliance increased from 4% to 0% at a lower number of ventilation days for a certain endpoint).

#### CLINICAL IMPLICATIONS

- Decrease in VAP occurrence
- Decrease in ventilator time
- Decrease in length of stay
- Improved patient outcomes
- Cost savings to organization

### REFERENCES


### DISCUSSION

Implementation of the IHI ventilator bundle resulted in a decrease in VAP rates in the ICU, CCU, and CVR. The addition of a comprehensive oral care protocol resulted in a substantial reduction in the incidence of VAP. Furthermore, the addition of the oral care protocol to the IHI ventilator bundle resulted in an estimated savings of $320,000 and an approximate 61.5% decrease in costs related to VAP.

### FIGURE 1.

VAP Rates Before and After Intervention

It is important to note that the relative reduction is larger from pre-intervention to post-intervention (CHG compliance increased from 4% to 0% at a lower number of ventilation days for a certain endpoint).