**Economic Evaluation of Antimicrobial IV Dressings**

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**Introduction**

The financial impact of caring for hospitalized patients with central venous catheters (CVCs) encompasses a range of costs, including CVC dressings, nursing labor time and possible treatment of local infections and catheter-related bloodstream infections (CRBSIs). CRBSIs represent notable clinical, mortality and economic risks for patients with CVCs, and the estimated cost for treating a single CRBSI exceeds $800,000.1,2 The annual total U.S. hospital cost of CRBSI exceeds $9 billion.2 Previous studies have demonstrated that the incidence of CRBSI and local infection are lower for chlorhexidine gluconate (CHG)-based dressings than for dressings without CHG.3,4 Two CHG-based CVC dressings and standard transparent film dressing were evaluated in a health economic model to compare total cost of care from the perspective of the hospital.

**Methods**

A systematic review of relevant literature was conducted, followed by nationwide surveys of U.S. nurses, physicians and hospital administrators to identify and evaluate labor and materials associated with the application of the dressings and with the costs of treating local infections and CRBSI. Fifty nurses who care for CVC patients participated in an in-depth survey of real clinical practices.1,2 After reviewing all relevant data including results of the survey and literature, a model structure was developed to assess the economic and clinical impact of using 3M™ Tegaderm™ Chlorhexidine Gluconate (CHG) IV Securum Dressing and BIOPATCH® Antimicrobial Dressing with Chlorhexidine Gluconate and a standard transparent film dressing. Model results were calculated using a rollback analysis. The expected cost per patient for each dressing was calculated by summing up the costs of transition along each path and weighting this by the probability of occurrence (averaging out the tree). Using this method, the clinical path can be determined.

The standard 1-way sensitivity analysis was based on the modification of basic clinical and economic assumptions in the model, in order to test the strength of the conclusions of the analysis over a range of structural assumptions, probability estimates and value judgments. The analysis was performed on selected parameters, which involves varying a parameter through a range of plausible values while holding other parameters fixed and assessing the effect on the overall outcome of the rollback analysis. If the optimal clinical path does not change over the entire range of parameter values then the model was defined as insensitive to that parameter over that range of values.

In the national nurse survey, nurses reported receiving longer training for BIOPATCH® than for Tegaderm™ CHG Dressing. Rates of dressing misapplication were significantly higher for BIOPATCH®; in Ebygberg’s study of 12 IV nurses, 25% of BIOPATCH®-dressed catheters were incorrectly applied immediately after training. In the national nurse survey, 68% of BIOPATCH® applications were reported as incorrect in clinical practice. The model conservatively uses an application error rate of 25% for BIOPATCH®, although the actual error rate could be significantly higher, as the survey results suggest. In Ebygberg’s study, 23 of 24 Tegaderm™ CHG dressings were applied correctly, suggesting an error rate of less than 5%.

**Results**

The model results are based on the data in Table 1, and tell a story for a hypothetical hospital with 1,300 CVC patients in a 12 month period. The misapplication of dressings is modeled to have substantial implications for the total cost of care. Figure 2 summarizes the higher rate of dressing misapplied for BIOPATCH® relative to Tegaderm™ CHG, and this persists even with higher nurse-reported rates of training on BIOPATCH®.

**Discussion**

The budget impact of CVC dressings on hospitals extends far beyond product price and into the prevention, detection and control of complications, such as local infection and CRBSI, and the downstream effects of reimbursement and public disclosure. The value to clinicians, patients, hospitals, payers and society of Tegaderm™ CHG Dressing is substantial, and is captured in the model as a quantitative economic impact on hospitals.

**Conclusions**

The model suggests that Tegaderm™ CHG Dressing could minimize healthcare costs by reducing the costs associated with the misapplication of BIOPATCH® and the use of transparent dressing alone. Tegaderm™ CHG Dressing is projected to have impact implications for clinical and economic outcomes due to its ease of use and intuitive application. Effectively managing the total cost of care should be a significant consideration for clinicians and hospitals in the context of caring for CVC patients.

**Table 1. Model Inputs and Data Sources**

<table>
<thead>
<tr>
<th>Model Component</th>
<th>Estimate</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dressing applied correctly</td>
<td>90%</td>
<td>Quintiles, 2008</td>
</tr>
<tr>
<td>Dressing incorrectly applied</td>
<td>10%</td>
<td>Quintiles, 2008</td>
</tr>
</tbody>
</table>

**Table 2. Projected Budget Impact at Hypothetical Hospital Is Lowest with Tegaderm™ CHG Dressing**

<table>
<thead>
<tr>
<th>CVC Dressing</th>
<th>Total Cost of Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tegaderm™ CHG Dressing</td>
<td>$3,092,681</td>
</tr>
<tr>
<td>Transparent Dressing Only</td>
<td>$6,283,706</td>
</tr>
</tbody>
</table>

**Figure 1. CVC Dressing Application Model**

Simplified representation of model. The BIOPATCH® and Transparent Dressing Only arms extend in identical format to the Tegaderm™ CHG Dressing arm.

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