Budget Impact Model to augment the value of an innovative device for the early detection of pressure ulcers in Scotland

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Objectives

Health authorities worldwide increasingly closely monitor pressure ulcer (PU) PUs can be considered a public health issue, since they represent a significant burden on the health and social care system, which could be reduced through proper patient management and early diagnosis in inpatient setting. A new portable device developed by Bruin Biometrics LLC detects sub-epidermal moisture changes, thus facilitating PU early detection. This would allow targeted care in patients considered more at risk of developing the condition.

In light of the target 50% reduction in PU incidence by December 2017 set by NHS Scotland, the present study aims at estimating the current cost of care and the potential benefit stemming from new device deployment over an 3-year time horizon in the Scottish healthcare setting.

Methods

Daily cost of care per grade of pressure ulcer severity (grade 1, 2, 3, and 4) were identified in the literature, as well as hospital length of stay (LOS). Those costs were inflated to 2016 using the Hospital and Community Health Services (HCHS) index.

Pressure ulcer classification adopted was the one agreed by the European Pressure Ulcer Advisory Panel (EPUAP).

Three complications were considered, which represent the most common sources of delayed healing: critical colonization, cellulitis and osteomyelitis.

Each complication was assessed with a probability of occurrence, additional LOS and cost of care.

Cost per episode per grade and complication were estimated (Table 1).

Those were combined with the probability of complication to obtain an expected cost per episode per grade.

Results

A comparison was performed between the current scenario without the device and the scenario with the device.

The new device would be expected to avert over 9,000 annual PU cases.

Fig 1: Yearly PU cases by grade

<table>
<thead>
<tr>
<th>Grade</th>
<th>Normal Healing</th>
<th>Critical Colonization</th>
<th>Cellulitis</th>
<th>Osteomyelitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>£1,285.45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 2</td>
<td>£6,503.96</td>
<td>£5,621.45</td>
<td>£6,122.18</td>
<td>£3,973.36</td>
</tr>
<tr>
<td>Grade 3</td>
<td>£7,184.87</td>
<td>£6,175.40</td>
<td>£11,604.41</td>
<td>£60,976.56</td>
</tr>
<tr>
<td>Grade 4</td>
<td>£9,302.85</td>
<td>£8,927.08</td>
<td>£12,146.09</td>
<td>£62,638.24</td>
</tr>
</tbody>
</table>

Table 1: Cost per episode per grade without complications

Costs were dismembered in labour costs (i.e. nurse time) and material costs (i.e. medical equipment, such as pressure-relieving mattresses) for each grade by using figures available in the relevant literature.

Incidence of PUs and grade distribution were derived from the literaturre (Table 2). Number of hospital beds and admission in Scotland were derived from NHS Scotland 2015 data.

The device is assumed to prevent 50% of grade 1 PUs according to data from the manufacturer.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Grade 1</td>
<td>35%</td>
</tr>
<tr>
<td>Grade 2</td>
<td>41%</td>
</tr>
<tr>
<td>Grade 3</td>
<td>11%</td>
</tr>
<tr>
<td>Grade 4</td>
<td>11%</td>
</tr>
</tbody>
</table>

Table 2: PU grade distribution

Conclusions

The new device reduces costs associated to PUs by early detecting changes in the skin moisture. It reduces occurrence of early grade PUs and degeneration to a more severe grade, overshooting the target 50% reduction set by NHS Scotland.

Based on this study, the initial cost associated to the purchase of the new device are offset by the savings stemming from reduced costs of care due to reduced number of PU cases. Savings exceeding £60M are generated as of year 1 and expected to grow to over £64M by year 3.

References


Total savings after the deployment of the new device would exceed £60M in year 1. Over half of those were imputable to labour (nearly £33M). Net annual cost associated to PUs dropped to approximately £15M. Total yearly savings would be expected to grow to over £64M by year 3, totaling £186.70M over the 3-year time horizon.