To what extent can pressure relieving surfaces help reduce the costs of pressure ulcers?

Pressure ulcers are costly for both healthcare budgets and individual patients. This case study estimated the likely savings from using pressure relieving surfaces.

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ABSTRACT Whitehead SJ, Trueman P (2010) To what extent can pressure relieving surfaces help reduce the costs of pressure ulcers? Nursing Times; 106: 30, 10-12. Pressure ulcers in acute care often involve extended hospital stays and additional health service resources. As well as the economic burden, pressure ulcers have a significant impact on patient morbidity. Pressure relieving surfaces have been recommended as a form of pressure ulcer prevention for patients at risk of developing ulcers, although such surfaces can be considerably more expensive than the standard ones used in hospitals.

This summary looks at the clinical and economic evidence on pressure relieving surfaces, and discusses the likely impact on hospital budgets as a result of investing in a range of pressure relieving surfaces.

The findings suggest that using pressure relieving surfaces for those at risk of developing a pressure ulcer can result in health service efficiencies and quality of life gains for patients.

BACKGROUND The management of pressure ulcers is an extremely costly activity that often does not receive the attention it deserves. An estimated 400,000 new pressure ulcers occur each year in England, with management costs reported to be £1.8-2.6bn per year, equivalent to around 2% of all healthcare expenditure (Posnett and Franks, 2000).

In addition to the financial burden, pressure ulcers also affect patient morbidity, carers, families and society as a whole.

Views differ about the extent to which pressure ulcers can be prevented (Brandeis et al, 2001). However, many can be avoided by preventive measures; using appropriate surfaces to reduce pressure, friction and shearing forces is an important part of prevention.

The Royal College of Nursing defined pressure-relieving devices as “beds, mattresses, overlays... cushions and other devices aimed at pressure redistribution” (National Institute for Health and Clinical Excellence, 2003). Although definitions for the different surface types available tend to vary, we have summarised the various surfaces using three broad categories, in line with other studies:

- Standard foam;
- Continuous low pressure;
- Alternating pressure.

The costs of these surfaces vary considerably.

NICE (2005) guidance recommended that people with pressure ulcers should have access to appropriate pressure relieving surfaces and strategies 24 hours a day. All those assessed as having a grade 1 or 2 ulcer should be allocated to a high specification foam mattress or cushion with pressure relieving properties, as a minimum provision. For those with grade 3 or 4 ulcers, minimum provision recommended is an alternating pressure mattress or sophisticated continuous low pressure system. These recommendations have implications for the choice of surfaces used in hospitals.

AIM We aimed to review the key clinical and economic evidence on the use of pressure relieving surfaces. In addition, the effects of changing the range of surfaces currently used in hospitals, measured in terms of the incidence of pressure ulcers and their financial implications, were explored using an illustrative case study.

This article presents a short summary of the findings (for a more detailed discussion, see Trueman and Whitehead, 2010).

LITERATURE REVIEW A targeted search of the published literature was conducted to identify clinical and economic evidence on pressure relieving surfaces. This was a purposive search to identify the best quality clinical studies and review articles on pressure relieving surfaces rather than a systematic literature search.

The papers identified were reviewed for relevance, with the key points from appropriate studies highlighted below.

Clinical evidence Several studies have reported the effectiveness of pressure-relieving surfaces in terms of the development of pressure ulcers but, in general, they have generated findings that are difficult to interpret.

Common limitations include small sample sizes, different definitions of surface types and categorisation of surfaces changing over time. It is often difficult to determine the extent to which study protocols were followed, and whether other aspects such as manual turning influenced the findings. This creates complexity in attempting to compare study results.

The Prevention of Pressure Ulcer Study (PPUS-1) and the PRESSURE (Pressure RELieving Support SURfaces: a Randomised Evaluation) trial are among the most robust...
Economic evidence
Economic evaluations of different surface types have been carried out, which examined both costs and effectiveness of surfaces.

An economic evaluation was conducted alongside the PRESSURE trial and found that alternating pressure overlays were more likely to be cost-effective than standard foam mattresses (Russell et al., 2006). Another high-quality evaluation (Fleurence, 2005) compared the two types of alternating pressure surfaces; this indicated that mattresses were more cost-effective than overlays for pre-existing superficial or severe pressure ulcers, but found the opposite was true for patients who were at risk of developing a pressure ulcer but did not have a pre-existing one.

There is a lack of economic evidence for the comparison of different types of high specification surfaces, that is, to determine whether the extra costs of high tech surfaces are justified by extra benefits, in terms of avoiding pressure ulcers, for example.

ILLUSTRATIVE CASE STUDY
In addition to the literature review, an illustrative case study exploring the impact of the use of pressure relieving surfaces on hospital budgets was developed. This considers inpatients at risk of developing a pressure ulcer in an average sized hospital in the UK, and examines the financial implications of moving some of these from standard foam surfaces to more advanced pressure relieving ones. Although this is intended to be a hypothetical analysis, the data used is derived from published sources.

The case study looks at a typical medium sized hospital with 500 beds, which operates at an 80% occupancy rate. The average length of stay is five days, the average for all elective stays in the UK (Hospital Episode Statistics, 2009). Based on this, the hospital has an estimated 29,220 admissions per year.

Applying these rates to our hypothetical hospital, we predict that an estimated 7,890 patients are treated for pressure ulcers each year, including 2,338 at risk patients.

Cost of managing pressure ulcers
The cost of management is based on a study (Bennett et al., 2004), which provides a comprehensive cost for managing different grades of pressure ulcers in the UK (Table 2). Patients who are identified as being at risk are assumed to cost the same to manage as those with a grade 1 ulcer.

Costs and effectiveness
The type of surface influences the likelihood of pressure ulcers developing. The probabilities of pressure ulcer development related to the different surfaces are taken from clinical studies (Table 3). The costs of the different surface types are average costs based on list prices, assuming surfaces are used for three years, also shown in Table 3.

Implications of allocating at risk patients to appropriate surfaces
Our analysis assumes that all patients identified as being at risk of developing a pressure ulcer are currently allocated to standard foam mattresses. Suppose that some are placed on a high specification

TABLE 1. PREVALENCE/INCIDENCE OF PRESSURE ULCERS

<table>
<thead>
<tr>
<th>Grade</th>
<th>Prevalence (%)</th>
<th>At risk (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>Grade 1</td>
<td>62</td>
<td>100</td>
</tr>
<tr>
<td>Grade 2</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Grade 3</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Grade 4</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

TABLE 2. COST OF MANAGING PRESSURE ULCERS BY GRADE

<table>
<thead>
<tr>
<th>Grade</th>
<th>Cost per patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>£1,064</td>
</tr>
<tr>
<td>Grade 2</td>
<td>£4,402</td>
</tr>
<tr>
<td>Grade 3</td>
<td>£7,313</td>
</tr>
<tr>
<td>Grade 4</td>
<td>£10,551</td>
</tr>
</tbody>
</table>


TABLE 3. COSTS AND PRESSURE ULCER DEVELOPMENT BY SURFACE TYPE

<table>
<thead>
<tr>
<th>Surface type</th>
<th>Probability of developing a pressure ulcer</th>
<th>Average cost of surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard foam</td>
<td>21.8% (Russell et al., 2003)</td>
<td>£383²a</td>
</tr>
<tr>
<td>Constant low pressure</td>
<td>8.9% (McInnes et al., 2008)</td>
<td>£1,810²b</td>
</tr>
<tr>
<td>Alternating pressure</td>
<td>6.8% (McInnes et al., 2008)</td>
<td>£2,500²c</td>
</tr>
</tbody>
</table>

a Average list price of Softform (MSS), Pentaflex (Huntleigh), TEMPUR (TEMPUR-MED), TheraRest (KCI);
b Average price of Duo (Hill-Rom), Breeze (Huntleigh), AtmosAir 4000 (KCI), AtmosAir 9000 (KCI), RIK Fluid Overlay (KCI), Therakair Visio (KCI);
c Average price of Nimbus 3 (Huntleigh), AlphaXcell (Huntleigh), Primo (Hill-Rom), ProfiCARE (KCI).

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surface, instead of standard foam; the case study findings show that when just 15% of patients who are at risk are allocated to pressure relieving surfaces, the likelihood of their developing pressure ulcers is reduced. As shown in Table 4, 48 pressure ulcers are avoided.

The high specification surfaces cost an additional £3,314. However, there are savings of £64,199 that would otherwise have been spent on pressure ulcer management. This is an overall saving of £60,885, which indicates that investing in pressure ulcer prevention is an efficient use of resources. Further details of the methods used for this calculation can be found in Trueman and Whitehead (2010).

**DISCUSSION**

Pressure ulcers are highly prevalent and have a significant impact on patients and health service resources. The use of pressure relieving surfaces is recommended to help prevent pressure ulcers (NICE, 2005). It is acknowledged that high specification surfaces are more expensive than surfaces used as standard in hospitals; however, our analysis suggests investing in pressure relieving surfaces can reduce the number of pressure ulcers and the associated costs of treatment, which can be substantial.

This analysis is based on a hypothetical cohort and brings together evidence from a number of studies to generate an illustrative case study of the costs associated with managing pressure ulcers. However, audits have shown cost savings from implementing an effective portfolio of surfaces for pressure ulcer management (Pagnamenta, 2007), which support these findings.

We are aware that not all patients need a high specification surface; instead, healthcare resources would be best directed towards those at increased risk. The critical issue for managing resources is how best to identify those at risk of developing a pressure ulcer during their hospital stay and ensure they are allocated an appropriate pressure relieving surface. Wound management professionals need to take an active role in providing screening tools that allow hospitals to allocate patients appropriately.

A further consideration is the degree to which our findings are relevant to practice. The “savings” generated in the example are based on avoiding pressure ulcers. It could be argued that these savings are not realised in practice, in that there is no cash saving associated with an avoided adverse event. While this is true to an extent, better patient management that avoids pressure ulcers will lead to greater efficiencies and ultimately reduced length of stay. As financing models for hospitals encourage and reward throughput, this could lead to increased hospital revenues.

Healthcare planners might also argue that the findings are irrelevant, as pressure relieving surfaces incur large acquisition costs that cannot be offset against savings from shorter stays or revenues from greater throughput. There is some sympathy for this argument. A portfolio or range of pressure relieving surfaces requires significant investment; however, this can be reduced by using rental agreements, which are available for many of the higher tech surfaces.

Furthermore, we should not lose sight of the primary aim of healthcare. Avoiding an adverse event during a hospital stay, such as a pressure ulcer, not only produces financial efficiencies but also prevents pain, suffering and the loss of quality of life that patients may otherwise experience. Whilenet attempt has been made to capture these here, this is a main aim for healthcare professionals.

**CONCLUSION**

Evidence suggests that pressure ulcers can be reduced by using pressure relieving surfaces for at risk patients in hospital. Despite the increased costs of acquiring such surfaces, our case study has illustrated that these costs can be offset by avoiding treatment costs. To reduce the strain on hospital budgets caused by pressure ulcers, a planned approach to pressure ulcer prevention and management, incorporating a range of pressure relieving surfaces, can improve NHS efficiency and patients’ quality of life.

This summary is based on the study by Trueman and Whitehead (2010). The review and development of the budget impact model were supported by a research grant from KCI Europe.

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