Are modern wound dressings a clinical and cost-effective alternative to the use of gauze?

Modern dressings are significantly more expensive per unit than traditional alternatives, but research has shown them to be more cost effective as they are associated with faster healing rates and fewer dressing changes.

foam dressing; gauze; cost effective; moist wound healing

In the 1960s two landmark studies established the concept of moist wound healing and heralded the development of modern dressings. However, despite the publication of a number of systematic reviews, there is no consensus on which dressings are most clinically and cost effective. This is due in part to the difficulty of conducting large randomised controlled trials (RCTs) as patients with wounds are not a heterogeneous group and often have complex underlying pathologies. It is also ethically questionable to conduct trials with dressings such as gauze that fail to provide optimal healing conditions.

This article reviews the evidence comparing the use, in clinical practice, of gauze and different generic groups of modern dressings, to assess their clinical benefits and cost effectiveness. The major electronic databases (EMBASE, Medline and Cinahl) were searched, as were congress abstracts and presentations, for clinical studies and case reports on the use of dressings in clinical practice. The search was conducted using the Cochrane Wounds Group guidelines. The search terms used were: (dressing* OR gauze OR 'tape and gauze') AND (wound* OR ulcer* OR burn*) AND clinical AND (economic OR cost effective).

Gauze versus modern dressings

If kept moist with saline, gauze is an effective wound dressing and can achieve similar healing times as occlusive dressings.

A review of moist wound healing dressings in the management of split-thickness skin-graft donor sites included 58 RCTs. It concluded that moist wound-healing products were superior in terms of healing, pain comfort and infection rates. However, the author commented that, since not all products perform to the same level, there is a need to review the performance of generic groups of dressings to form accurate clinical guidelines on the use of one group over another.

Table 1 outlines some 'modern occlusive' wound dressings. Each has advantages and disadvantages. Comparative qualities are shown in Table 2.

Gauze versus hydrocolloids

Clinical effectiveness

Aim et al. undertook a RCT comparing an occlusive hydrocolloid dressing (Comfeel Ulcus, Coloplast) with wet saline gauze. Analysis of the healing distribution function showed that the hydrocolloid was more effective, although the overall difference was not significant (p=0.15).

A later study by Colwell et al. compared the efficacy and cost effectiveness of moist gauze dressings and a hydrocolloid wafer dressing (DuoDERM CGF, ConvaTec). Only one ulcer healed in the moist gauze dressing group, while 11 healed in the hydrocolloid group.

Cost effectiveness

In a cost-effectiveness analysis conducted in the US the product with the lowest acquisition price (gauze) proved the most costly due to the higher nursing costs associated with the more frequent dressings changes (US$996 for gauze versus US$152-170 for hydrocolloid) and to the number of ulcers treated with gauze that remained unhealed after 12 weeks of care. The average number of dressing changes needed per ulcer over the 12-week study period was 171 for gauze and 26 for the hydrocolloid.

For a hypothetical managed-care plan, Kerstein et al. calculated the cost to the US health-care system each year of managing ulcers over a 12-week period to be US$1.9 million less for pressure ulcers and US$0.5 million less for venous ulcers using modern dressings when compared with gauze.

Colwell et al. demonstrated that the average cost per hydrocolloid case was US$3.68 versus US$7.90 for moist gauze.

A cost-effectiveness analysis of DuoDERM CGF (ConvaTec) versus saline gauze found that the...
I practice that the median nursing time associated with use of the hydrocolloid dressing was one-eighth that of gauze. Using national nursing salaries in the US at the time (1992), the median costs per ulcer were $15.90 for those treated with hydrocolloid and $25.31 for those given gauze (p=0.04).

More recently, Meaume and Gemmen used a cost-effectiveness model to determine the costs associated with pressure and leg ulcer care protocols, and established that the most expensive element of care was clinician labour.

Of the three regimens studied by the investigators, modelled on a typical European patient cohort, management with a hydrocolloid was found to be more cost effective.

### Gauze versus foam dressings

#### Clinical effectiveness

A Health Technology Assessment (HTA) of debriding agents used to treat surgical wounds included four studies that compared silicone foam dressings and one that compared polyurethane foam dressings with traditional gauze. Table 3 summarises the outcome measures.

An additional study comparing gauze with foam dressings was identified in the recent Cochrane review of dressings and topical agents for surgical wounds healing by secondary intention. In this small RCT no differences were found between the two study arms, although the authors stated that the foam dressings were 'more comfortable' than gauze.

Another study, published in duplicate, of partial-thickness donor sites treated with Allevyn Adhesive (Smith & Nephew) or paraffin gauze reported that, by day 7, 41 of the Allevyn Adhesive sites and 16 of the gauze sites had completely healed (p<0.001). The foam dressing was associated with significantly less pain on removal than the gauze.

In the management of acute wounds, such as donor sites, modern dressings have been found to...
Table 3. Foam versus gauze dressings: results for resource use and other outcome measures

<table>
<thead>
<tr>
<th>Study, design, sample size (no. of arms)</th>
<th>Condition</th>
<th>Duration</th>
<th>Resource use</th>
<th>Dressing comfort and performance</th>
<th>Other outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Silicone foam versus gauze dressings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macfie and McMahon 1980&lt;sup&gt;20&lt;/sup&gt; RCT, n=50 (2)</td>
<td>Perineal wounds</td>
<td>Until healing</td>
<td>No. of inpatient days: No significant (p&gt;0.05) difference: 23.8 days in foam group versus 22.8 days in gauze group — excluding convalescence</td>
<td>Pain: 15 patients in gauze group and four in foam group required analgesia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No. of home visits: Significantly (p&lt;0.001) less in foam group (14.1) than gauze group (46.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walker et al., 1991&lt;sup&gt;22&lt;/sup&gt; RCT, n=75 (4)</td>
<td>Pilonidal sinus wounds and incised abscesses</td>
<td>Until healing</td>
<td>Days to hospital discharge: No significant difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Williams et al., 1981&lt;sup&gt;23&lt;/sup&gt; RCT, n=80 (2)</td>
<td>Pilonidal sinus wounds</td>
<td>Until healing</td>
<td>Mean time to hospital discharge: No significant difference: 8.5 days in foam group versus 7.3 days in gauze group</td>
<td>Discomfort on dressing removal: Significantly greater in foam group (2.9) than foam group (1.4)</td>
<td>Days work lost: No significant difference: foam group 45.4 versus gauze group 38.6</td>
</tr>
<tr>
<td>Eldrup 1985&lt;sup&gt;26&lt;/sup&gt; RCT, n=33 (2)</td>
<td>Pilonidal sinus wounds</td>
<td>Until healing</td>
<td>No. of home visits: No difference reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ricci et al., 1998&lt;sup&gt;24&lt;/sup&gt; Controlled trial n=12 (2)</td>
<td>Pilonidal sinus wounds</td>
<td>Until healing</td>
<td>No. of dressings used: Less in foam group (20) than in gauze group (968). Variance not measured</td>
<td>Comfort: Foam stated as more comfortable, but no data reported</td>
<td></td>
</tr>
<tr>
<td><strong>Polyurethane foam versus gauze dressing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meyer, 1997&lt;sup&gt;25&lt;/sup&gt; RCT, n=43, (2)</td>
<td>Abdominal surgery or abscess incision</td>
<td>4 weeks</td>
<td>No. of dressing changes: Approximately three times more frequent in gauze group than in foam group at weeks 3 (mean 0.28/0.69) and 4 (mean 0.14/0.39)</td>
<td>Pain at week 4: Significantly greater in gauze group (1.82) than foam group (0.86). Variance not measured</td>
<td>No. of wounds closed surgically: Four in Allevyn Cavity group and two in gauze group (RR=2.1, 95% CI, 0.5-9.15)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Erythema: Significant reduction after 1 week in Allevyn Cavity group; 3 weeks in gauze group</td>
<td>Erythema: Significant reduction after 1 week in Allevyn Cavity group; 3 weeks in gauze group</td>
<td>Infection: Significant reduction after 1 week in Allevyn Cavity group; 3 weeks in gauze group</td>
</tr>
</tbody>
</table>

† Measured using visual analogue scale (VAS)
RCT = randomised controlled trial
RR = relative risk
CI = confidence interval
Adapted from Lewis et al. and Bradley et al.
be statistically superior to tape and gauze, confirming the findings of experimental models of moist wound healing. Two systematic reviews have shown that modern dressings have advantages over gauze in terms of healing, pain/comfort and infection rates, patient satisfaction and use of nursing resources.

### Cost effectiveness

Kraft et al. compared the cost effectiveness of gauze and foam dressings in the management of grade II and III pressure ulcers. Despite the higher unit acquisition cost of the foam dressing (Epi-Lock, Calgon Vestal), its use was associated with 18.5 fewer dressing changes over the 24-week study period, making it a cost-effective alternative to gauze.

Gates and Holloway studied 40 patients who had undergone either a Cesarean section or an abdominal hysterectomy. They received either a wet-to-dry dressing (saline-soaked gauze sponges and a gauze cover) or IntraSite Gel (Smith & Nephew), foam wound-cavity filler (Allevyn Cavity, Smith & Nephew) and BIOCLUSIVE dressing (Johnson & Johnson). Wounds in the foam dressing group underwent secondary closure in 5.1 days versus 8.5 days for the gauze, and required three versus 25 dressing changes. Average cost savings with the foam regimen were $572.60 (1992 values) per closed wound, and would have been greater had analgesia and extended hospital stay been included in the calculation.

### Discussion

The lack of evidence from well-controlled RCTs evaluating the clinical and cost effectiveness of wound-care products is due to a number of factors:

- The heterogeneity and complex underlying pathologies of many patients with chronic wounds
- The difficulty of blinding any treatment involving a physical dressing
- The fact that no single product is suitable for all wound types or all stages of the healing process.

Considering the acquisition cost of dressing products but ignoring the number of dressing changes or home visits made when assessing the monetary impact of care procedures is misleading, especially in the case of ulcer management protocols. An expensive dressing may incur less cost than a cheaper one when the complete episode of care is taken into account. Any decrease in the healing time is likely to promote both social and economic advantages for the patient by ensuring a shorter duration of pain and discomfort, as well as early mobilisation.
Therefore, there is a need for evidence-based information to aid selection of the most appropriate wound management product. This is particularly important for nurse prescribers as most wound management products are in the existing nurses’ formulary.

Fig 1. Foam versus gauze: cleansing agents per wound type

<table>
<thead>
<tr>
<th>Foam</th>
<th>Comparator</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

Box 1. Summary of the main findings

This review assesses the evidence to determine the clinical benefits and cost-effectiveness of gauze versus modern dressings.

- The literature shows that hydrocolloids and foam dressings are more cost-effective than gauze and achieve better patient outcomes.

- Although the purchase cost of modern dressings is higher than gauze, they require fewer dressing changes and sometimes achieve faster healing rates, meaning the overall cost of treatment is lower.

- Reported clinical advantages of modern dressings over gauze include better healing, pain/comfort and lower infection rates and greater patient satisfaction.

This work was commissioned by Smith & Nephew.