The cost-effectiveness of wound management protocols of care
Harding K, Cutting K, Price P

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The study examined wound care dressings for ulcers and pressure sores. For pressure sores, conventional gauze was compared with two hydrocolloid dressings, Granuflex (Convatec Ltd., Uxbridge) and Comfeel (Coloplast Ltd., Peterborough). For venous leg ulcers, conventional gauze was compared with Granuflex and a skin replacement compound, Apligraf (Novartis Pharmaceuticals Ltd., Camberley, Surrey). There was no ‘do nothing’ option.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with either pressure sores or venous leg ulcers. Age, gender and other demographic characteristics were not provided. Patients with diabetes and/or infections in their wounds were excluded from most of the source studies on which this analysis was based.

Setting
Treatment for pressure sores was within a secondary or other hospital setting. Treatments for ulcers were assumed to be in a community setting. The economic study was carried out in the United Kingdom.

Dates to which data relate
The effectiveness evidence of treatments for pressure sores was extracted from studies published between 1984 and 1999. That for the treatment of venous leg ulcers was taken from studies published between 1988 and 1998. The resource use data were extracted from the same sources as the effectiveness data. The unit costs were taken from a 1999 source and from other sources for which the date was not stated.

Source of effectiveness data
The effectiveness data were derived from a meta-analysis of completed studies and from expert opinion.

Modelling
A simple model was used to combine the effectiveness and cost data to calculate the cost-effectiveness of the different interventions. The type of model employed was not stated.

Outcomes assessed in the review
The outcomes assessed in the review were the duration of treatment, healing rates, infection rates, average number of
dressing changes per week, and labour time and cost.

**Study designs and other criteria for inclusion in the review**
The designs of the studies included in the review were not stated. To be included, a study had to report the healing rates over a 4- to 12-week period.

**Sources searched to identify primary studies**
MEDLINE was searched in May 2000.

**Criteria used to ensure the validity of primary studies**
Not stated.

**Methods used to judge relevance and validity, and for extracting data**
Not stated.

**Number of primary studies included**
Twenty-five primary studies were included. There were 15 in the analysis of pressure sores and 12 for the analysis of venous leg ulcers (2 studies appeared in both analyses). The type of studies included was not stated.

**Methods of combining primary studies**
The primary studies were combined by a meta-analysis based on weighted means.

**Investigation of differences between primary studies**
Not stated.

**Results of the review**
The duration of the treatment was up to 12 weeks.

In the pressure sore analysis, the 12-week healing rate was 51% for gauze, 61% for Granuflex and 48% for Comfeel.

The average number of dressing changes per week was 14 for gauze, 2 for Granuflex and 2 for Comfeel.

In the venous leg ulcer analysis, the 12-week healing rate was 40% for gauze, 52% for Granuflex and 45% for Apligraf.

The average number of dressing changes per week was 4 for gauze and 2 for Granuflex. For Apligraf, the number was one for weeks 1 - 5 and zero for weeks 6 - 12.

**Methods used to derive estimates of effectiveness**
Where estimates of parameters were not available from the literature, expert opinion (in the form of four general practitioners from Europe) was called upon using a Delphi-panel-based approach.

**Estimates of effectiveness and key assumptions**
Expert opinion was relied upon to estimate physician time use, use of debridement, antibiotics and compression bandaging.
Physician time (i.e. routine general practitioner visits) was assumed to be zero for both the pressure sores and venous leg ulcers analyses. Nursing time for dressing changes was estimated at 20 minutes for pressure sores and 24 minutes for leg ulcer treatment.

In the case of both analyses, initial surgical debridement (by a physician) was estimated to be required in 25% of wounds, and subsequent debridement in 13%. Non-surgical debridement (by a nurse) was assumed to be required in 50% of all wounds.

In case of wound infection, a course of antibiotics (500 mg amoxycillin, taken 3 times daily for 10 days) was assumed.

Compression bandaging was not relevant to pressure sores, but was assumed to need changing 3 times a week for leg ulcer patients.

Measure of benefits used in the economic analysis
No summary measure of health benefit was calculated. Therefore, this study is classified as a cost-consequences analysis.

Direct costs
The quantities and the costs were not reported separately. The costs included were those relevant to a hospital setting. The direct costs included were for the bandage or dressing, ancillary supplies to cleanse and dress wounds, treatments for wound complications and physician or nurse time. The costs were taken from the UK Drug Tariff, British National Formulary, and Unit Costs of Health and Social Care (PSSRU, University of Kent at Canterbury). Discounting was not relevant since all the costs were incurred over only 12 weeks. The authors reported an average cost per wound healed. The costs appear to have been taken from 1999 sources.

Statistical analysis of costs
No statistical analysis of the costs was reported.

Indirect Costs
Not applicable.

Currency
UK pounds sterling (€).

Sensitivity analysis
No sensitivity analysis was reported.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The costs were reported per wound healed. The authors stated that the costs associated with infection (e.g. antibiotic treatment) were included, but no details were provided.

Synthesis of costs and benefits
In the pressure sores analysis, the cost per wound healed was 2,663 (nurse time 2,548, dressing 115) for gauze, 422
(nurse time 298, dressing 124) for Granuflex and 642 (nurse time 453, dressing 189) for Comfeel.

In the venous ulcer wound analysis, the cost per wound healed was 541 (nurse time 327, compression 166, dressing 48 and other 0) for gauze. The corresponding cost for Granuflex was 342 (nurse time 97, compression 121, dressing 125, and other 0), and for Apligraf 6,741 (nurse time 70, compression 144, dressing 6,526, and other 1).

No statistical analyses were carried out.

Authors' conclusions
The authors suggest that the lowest cost per wound healed in both cases was Granuflex. The use of traditional gauze dressings is a "false economy and cannot be justified". Due to their cost, skin replacements should be used sparingly, for example, only in "recalcitrant, non-healing wounds".

CRD COMMENTARY - Selection of comparators
The comparators were selected in a pragmatic way, dependent, to a certain extent, on the availability of data from the literature. However, all were compared with "traditional" gauze. No 'do nothing' approach was included. You must decide if this represents current practice in your setting.

Validity of estimate of measure of effectiveness
The authors undertook a review of the literature, but it is unclear whether this was conducted in a systematic way to identify all relevant studies and minimise biases. The authors described their method of combining the results from studies as a "pooled analysis" (taking weighted averages). They stated, quite rightly, that a formal meta-analysis was not possible due to a lack of uniformity in the published studies. However, they do not appear to have considered the impact of differences between effectiveness estimates in the primary studies (e.g. through a sensitivity analysis).

Where data were not available from the literature, the authors sought expert opinion in the form of a Delphi panel made up of four general practitioners from across Europe. This is a valid approach to generate consensus opinion in the absence of clinical evidence, although the use of European rather than purely UK general practitioners may reduce the applicability of the conclusions to a strictly NHS perspective (the authors made it clear that their perspective was pan-European). No sensitivity analysis of any parameters was performed.

The results were reported as the cost per wound healed. This does not consider additional factors such as the length of time for healing, and pain or other complications during the healing process. The results may, therefore, be biased in favour of those treatments that took longer to heal wounds.

Validity of estimate of measure of benefit
The authors did not derive a summary measure of health benefit. The analysis was therefore categorised as a cost-consequences analysis.

Validity of estimate of costs
All the categories of cost relevant to the perspective adopted were included in the analysis, but some cost items were excluded. For example, the bed occupancy costs for pressure sore patients. This was correctly justified on the grounds that pressure sores are not usually the primary reason for hospitalisation.

The costs and the quantities were not reported separately. In addition, generally, the information on the costs was very limited. For example, it is unclear how the cost of antibiotics used to treat infections was incorporated. A summary table of unit and total costs and quantities would have considerably enhanced the generalisability of these results to other settings.

No statistical or sensitivity analyses of the costs or quantities were performed. It is also unclear whether or not the prices were quoted in a constant price year. Discounting was irrelevant since all the costs were incurred in a time period
of up to 12 weeks.

**Other issues**
The authors made appropriate comparisons of their results with those from other studies. However, the issue of generalisability to other settings was not addressed. Generalisability was further hampered by the limited cost information. The authors do not appear to have presented their results selectively. Their conclusions reflected the scope of their analysis.

The authors acknowledged a number of limitations to their study. First, that the analysis was "an exercise in compromise between experts from different health-care systems and settings". Second, that there is a relative lack of published comparative studies of wound treatments. A further limitation was the use of average cost-effectiveness ratios to compare treatments, rather than the incremental cost-effectiveness ratio. It may be that one treatment has a higher cost per wound healed than another, but heals more wounds. If the extra cost per extra wound healed is deemed to be sufficiently acceptable, then this treatment may be favoured. Of course, if all wounds are fully healed, the outcomes of each treatment are identical, and the study therefore becomes a cost-minimisation analysis.

**Implications of the study**
The authors suggest that the use of Granuflex offers the lowest cost per wound healed, and should therefore be recommended in the treatment of wounds. This study considers wound healing in two settings, hospital-based pressure sore treatment and community-based ulcer treatment. Future work should look at the treatment of the two wounds in different settings.

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