An economic evaluation of VAC therapy compared with wound dressings in the treatment of diabetic foot ulcers

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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.

CRD summary
This study examined the cost-effectiveness of Vacuum Assisted Closure (VAC) therapy in comparison with both traditional and advanced wound dressings in the treatment of diabetic foot ulcers. The authors concluded that VAC therapy was more effective and less expensive than both traditional and advanced dressings. On the whole the level of reporting was good and the quality of the study was satisfactory. The authors' conclusions appear to be appropriate, although future studies should corroborate these findings with direct clinical comparisons.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
This study examined the cost-effectiveness of Vacuum Assisted Closure (VAC) therapy in comparison with both traditional and advanced wound dressings in the treatment of diabetic foot ulcers.

Interventions
The VAC device consisted of open-pore foam (reticulated polyurethane or polyvinyl alcohol) dressings cut to the shape of the wound and a vacuum unit providing either continuous or intermittent negative pressure. Patients whose wounds did not heal with VAC therapy were switched to advanced dressings after three months. Advanced wound dressings included two treatments considered to be skin substitutes, which were Apligraf and Dermagraft. The traditional wound dressing was saline gauze.

Location/setting
USA/secondary care.

Methods
Analytical approach:
This economic evaluation was based on a Markov model with a one-year time horizon. The authors stated that the perspective of the payer (the national health service or the insurer) was adopted.

Effectiveness data:
The clinical data on traditional and advanced dressings were identified through a search of electronic databases of medical literature, the internet, and references listed in identified articles. The search included comparative studies or randomised controlled trials (RCTs). The data on VAC effectiveness were derived from RCTs, which seemed to be known to the authors. It appears that no head-to-head comparisons between VAC and advanced dressings were found. Some assumptions were necessary, due to a lack of clinical data for some transition probabilities. The key clinical endpoint was the healing rate.

Monetary benefit and utility valuations:
The utility valuations were derived from published sources and the utility weights were reported, but no other details were given.

Measure of benefit:
The summary benefit measures were the rate of amputations avoided, the percentage of wounds that healed completely.
in a year, and quality-adjusted life-years (QALYs) gained with treatment.

Cost data:
The economic analysis included the costs of dressings, hospital stay, out-patient services (office and home visits), antibiotics, prostheses, and amputations. The resource use data were based on published sources and authors’ assumptions. The costs were obtained from Medicare reimbursement rates, from a national administrative database, and expert opinion. All costs were in US dollars ($) and the price year was 2006.

Analysis of uncertainty:
A deterministic one-way sensitivity analysis was undertaken to examine the impact of variations in the cost of VAC, its effectiveness, and the length of stay. An alternative scenario assessed VAC treatment for 12 months regardless of the treatment success.

Results
In the comparison between VAC and traditional dressings, the expected costs per patient were $57,944 with VAC and $79,951 with traditional dressings. The expected QALYs, were 0.53 with VAC and 0.52 with traditional dressings. The amputations were 0.0042 with VAC and 0.0046 with traditional dressings and the percentage of wounds that healed in a year was 54% with VAC and 52% with traditional dressings.

In the comparison between VAC and advanced dressings, the expected costs per patient were $52,830 with VAC and $61,757 with advanced dressings. The expected QALYs, were 0.54 with VAC and 0.53 with advanced dressings. The amputations were 0.0011 with VAC and 0.0012 with advanced dressings. The percentage of wounds that healed in a year was 61% with VAC and 59% with advanced dressings.

Thus, under base-case conditions, VAC was the dominant strategy, which means it was less expensive and more effective than its comparators.

The sensitivity analysis showed that the base-case findings were robust. While the cost of VAC therapy remained below $6,000 (it was $4,971 in the base case), VAC was the dominant option.

Authors’ conclusions
The authors concluded that VAC treatment was more effective and less expensive than both traditional and advanced dressings. They stated that further comparative studies of VAC therapy with advanced dressings should be carried out.

CRD commentary
Interventions:
The authors justified their selection of the comparators, which were appropriately chosen. Both advanced and traditional dressings were considered. They acknowledged that Apligraf and Dermagraft might not represent all advanced wound dressings.

Effectiveness/benefits:
The effectiveness data were derived from published studies using a systematic literature search. This approach is considered valid for ensuring the selection of the most appropriate and relevant clinical sources. Some information on the design of these sources was reported. The main effectiveness parameters were derived from published RCTs, which should have ensured that the clinical estimates were robust. The authors acknowledged that no head-to-head comparisons were found and that the clinical data were based on indirect comparisons. Both generic (QALYs) and disease-specific (amputations and healing rates) benefit measures were appropriately used and QALYs are appropriate for capturing the impact of the interventions on the quality of life. The derivation of the utility estimates was not clearly described.

Costs:
The analysis of costs was consistent with the economic viewpoint, both in terms of the cost categories and their sources. Some data on the unit costs and quantities of resources used were presented separately, which will help when replicating the analysis in other settings. The price year and the main sources of resource use and cost data were fully reported. In
general, the economic analysis appears to have been well carried out.

Analysis and results:
The synthesis of the costs and benefits was appropriately carried out using an incremental approach, the results of which were clearly presented. The issue of uncertainty was investigated in a deterministic sensitivity analysis, although only a few of the model inputs were considered. A more comprehensive assessment of uncertainty would have been useful, but this analysis demonstrated that the findings were robust. The model structure was presented in a diagram with all the relevant details such as the cycle length and modelling assumptions. The authors stated that, whenever possible, a conservative approach was taken to minimise the bias in favour of VAC therapy. Finally, the authors noted and discussed some limitations of their analysis such as the heterogeneity among the sources of data and the need for some simplifications.

Concluding remarks:
On the whole the level of reporting was good and the quality of the study was satisfactory. The authors’ conclusions appear to be appropriate, although future studies should corroborate these findings with direct clinical comparisons.

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