A comprehensive program to prevent pressure ulcers in long-term care: exploring costs and outcomes

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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.

Health technology
The authors assessed comprehensive protocols of care (SOLUTIONS, ConvaTec, a Bristol-Myers Squibb Company) for the prevention of pressure ulcers in long-term care. The protocols focused on risk factors identified in accordance with the Braden Scale.

The comprehensive programme for pressure ulcer prevention comprised the Braden Scale for the prediction of pressure sores and its corresponding care plan algorithms (based on the level of pressure ulcer). A major strength of this programme was that the pressure ulcer risk assessment and associated algorithms were validated. The programme also included nutritional supplementation and a continuing education module for nurses and physicians on the treatment and prevention of chronic ulcers.

Type of intervention

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised individuals in long-term care at risk of developing pressure ulcers. The only inclusion criterion was that residents within the study setting were identified as at risk for pressure ulcers by having at least one pressure ulcer risk factor (identified by the literature), or were identified as at risk by a validated risk assessment tool (Norton Scale and Braden Scale).

Setting
The setting was tertiary care (long-term care facilities). The economic study was carried out in New Jersey, USA.

Dates to which data relate
The effectiveness and cost data were collected between January 1999 and July 1999 (Phase I) and then between August 1999 and December 1999 (Phase II). A price year was not reported.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was carried out prospectively on the same sample of patients as that used in the effectiveness study.
Study sample
The study sample was selected using a "convenience sample". Power calculations, to estimate the influence of chance on the results, were not used to inform the sample selection process. The sample was appropriate for the clinical question since it included patients who may benefit from the protocols of care introduced. A total of 203 patients met the inclusion criteria for the study, of which 65 (32%) were subsequently excluded because they arrived at the setting with pressure ulcers. Documentation for pressure ulcer risk was noted for 136 (67%) residents. These residents had a mean age of 82 years (standard deviation, SD=12.38), 72% were female, 97% were white, and 78% were transferred from hospitals.

In total, 127 residents were considered at high risk for pressure ulcers. The research nurse considered a participant to be at risk if they demonstrated at least one risk factor for pressure ulcer development, as identified in the literature (e.g. bed-bound, chair-bound, urinary or faecal incontinence, albumin less than 3.5 mg/dL). Participants were also identified as at risk by the Norton scale, which was used by both long-term care facilities.

Study design
The basis of the study was a historical and prospective case series analysis. The retrospective charts were reviewed for 5 months before the implementation of the comprehensive prevention protocol of care. The participants were then followed prospectively for the next 5 months to compare the before and after effects of introducing the care protocols. The study was set at two long-term care facilities that did not use comprehensive prevention protocols of care. The total bed capacities were 150 (facility A) and 110 (facility B). The authors did not report any loss to follow-up.

Analysis of effectiveness
The analysis was based on all those patients who entered the study. The primary health outcome was the incidence rate of pressure ulcers, although the authors did record some other outcomes for Phase I. No significant demographic differences were found between Phase I and Phase II.

Effectiveness results
For high-risk patients (n=127) during Phase I, 97.6% had a skin assessment, 65.4% received nutritional consultation on admission, 64.6% were placed on a support surface, and 61.4% were documented to be repositioned every 2 hours.

There was no statistically significant association between pressure ulcer risk and nutritional consultation, placement of an overlay, placement of an overlay at least 4 inches thick, repositioning every 2 hours, and skin assessment.

The cumulative incidence rate during Phase I was 43.3%.

The Phase II cumulative 5-month incidence rate was 28.5%.

For the high-risk individuals in facility A, the incidence rate fell from 13.2 to 1.7%, representing an 87% reduction, (p=0.02).

For the high-risk individuals in facility B, the incidence fell from 15 to 3.5%, also representing an 87% incidence reduction, (p=0.02).

An estimated 614 ulcer-free residents were gained in facility A and 412 in facility B.

Clinical conclusions
The authors concluded that using a consistent protocol of care, such as this comprehensive prevention programme, "significantly reduced the incidence of pressure ulcers in two long-term care facilities".

Measure of benefits used in the economic analysis
No summary measure of benefits was produced. In effect, the authors carried out a cost-consequences analysis.
Direct costs
The authors did not state the perspective adopted in the costing analysis. The authors aimed to assess the costs (labour, supplies) of ulcer prevention. These costs were estimated at each facility using an activity-based costing mode for the period of the study. Supplies (skin care products, support surface) were costed through the purchasing department in each facility. The labour costs were based on average hourly salaries. The costs were split into categories of risk assessment labour, skin care labour and supplies, mattress support surface, chair support surfaces, nutrition, and the labour of certified nursing assistants in repositioning patients. The costing accounted for the Hawthorne effect (effects due to special attention) by conducting the costing 2 months into the prevention programme. The nursing time was reported. However, the quantities and the costs were not analysed separately.

Discounting was unnecessary due to the short-term horizon of the study. The price year was not reported. The authors estimated the cost per high-risk resident per month. Since each resident was expected to gain only one ulcer, this was equivalent to estimating the cost per ulcer prevented per month.

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

Indirect Costs
The indirect costs were not estimated, as they were not relevant to the study.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis of the costs was reported.

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

Cost results
The average cost per month to prevent ulcers in one high-risk resident was $796.73.

The 5-month cost to prevent pressure ulcers in one high-risk resident was $2,875.65

Synthesis of costs and benefits
The pressure ulcer prevention cost per high-risk resident per month was $575.14 to reduce the incidence of ulcers.

The cost of prevention for a high-risk resident who remained pressure-ulcer free per month varied from $4.35 to $7.53.

Authors' conclusions
The comprehensive prevention protocols significantly reduced the incidence of pressure ulcers. Standardising care with targeted interventions based on level of risk was more cost-effective over the 5-month period.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparators (no comprehensive protocols of care) was clear. The authors might have
defined two or more patient groups to compare different elements of the protocols, such as regular repositioning or mattress supports. This might have guided later choices about which were the most cost-effective elements of care, especially as the cost estimates reflected this broken down structure.

**Validity of estimate of measure of effectiveness**

The basis of the analysis was a historical and prospective case series. This kind of analysis ensures that there are no systematic differences between the two groups in terms of demographics, and it improves internal validity. However, as there was only a single group of patients there was no independent comparator. Introducing a control group who did not receive the protocols would have provided a standard comparator, and a comparator for the costing. In addition, a further group could have compared selective elements of the protocols to assess which protocol elements were most cost-effective. Power calculations were not carried out, thus the sample may have been of insufficient size to obtain robust results. The study sample was representative of the study population since it included only individuals in long-term care who were proven to be at risk of pressure ulcers.

**Validity of estimate of measure of benefit**

The benefits were estimated directly from the effectiveness analysis. The authors may have explicitly tried to estimate the number of ulcers avoided, although this might have required both treatment and control groups of patients. Alternatively, the authors may have used generic quality-of-life scales to compare the results more widely.

**Validity of estimate of costs**

The authors did not state a perspective for the cost analysis. Therefore, it is not possible to comment on whether all the relevant costs were included. The nature of the costs included suggests that the perspective may have been that of the health care facility or third-party payer. As there was no comparator technology and no statistical analysis of the costs, it is not possible to assess whether omissions in cost may alter the principle conclusions drawn. The unit costs, price year and a sensitivity analysis were not reported, which limits the generalisability of the economic analysis to other settings and prevents reflation exercises. A breakdown of the costs would have improved the reader's understanding of the costs reported, but none was provided.

**Other issues**

The authors made appropriate comparisons of their findings with those from other studies, highlighting similarities in the effectiveness results and differences in the cost results. The issue of the generalisability to other settings was not addressed. Although the use of two facilities may improve the overall generalisability, the lack of detail about the facilities limits the reader's ability to determine how the study setting compares with their own setting. The results were not presented selectively, although more details of the cost results would have improved the reader's understanding of the key cost drivers. The conclusions drawn were a true reflection of the results presented. A number of study limitations were presented. These focused on costing elements, such as using day shift costs and excluding learning costs in the early stages of Phase I and Phase II.

**Implications of the study**

The authors suggested that, as ulcer prevention can be quite costly, targeted prevention should be initiated based on the individual's level of risk. They also suggested that further studies are needed to investigate whether prevention is more cost-effective than treatment.

**Source of funding**

Funded by ConvaTec, and Mead Johnson and Co.

**Bibliographic details**


**PubMedID**
11993061

**Other publications of related interest**


**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Aged; Aged, 80 and over; Cost-Benefit Analysis; Data Collection; Female; Humans; Incidence; Long-Term Care /economics; Male; Pressure Ulcer /economics /etiology /prevention & control; Retrospective Studies; Risk Factors

**AccessionNumber**
22002006610

**Date bibliographic record published**
31/01/2005

**Date abstract record published**
31/01/2005