Pressure ulcer prevention program study: a randomized, controlled prospective comparative value evaluation of 2 pressure ulcer prevention strategies in nursing and rehabilitation centers

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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 assessed the cost-effectiveness of a Pressure Ulcer Prevention Program (PUPP) for the reduction or prevention of pressure ulcers in rehabilitation and nursing care residents at risk of developing pressure ulcers. The authors concluded that PUPP resulted in a significant reduction in pressure ulcer incidence compare with standard care, and was more cost efficient. The study methodology and reporting was adequate. The authors’ conclusions appear to be appropriate, but the robustness of the results is unclear.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The cost-effectiveness of a Pressure Ulcer Prevention Program (PUPP) was assessed in the reduction or prevention of pressure ulcers in rehabilitation and nursing care residents at risk of developing pressure ulcers.

Interventions
The Pressure Ulcer Prevention Program (PUPP) intervention consisted of a product bundle, decision algorithms driven by Minimum Data Set (MDS) 2.0 Resident Assessment Scores, and formal staff education. The comparator was standard practice of pressure ulcer prevention (using Agency for Healthcare Research and Quality guidelines and standard skin care products, briefs, pads, and mattresses).

Location/setting
USA/residential care.

Methods
Analytical approach:
A randomised controlled prospective unblinded cohort study was conducted across two nursing and rehabilitation centres (83 participants in PUPP intervention group; 50 participants in control group). All nursing staff received formal education on pressure ulcer prevention prior to commencement of the trial. Residents were followed until discharge, death, development of pressure ulcer, or for a maximum of six months. The population consisted of Medicare-eligible residents at risk of developing pressure ulcers (EQUIP-for-Quality Risk Score Moderate to Very High). Groups were shown to be comparable at baseline. A decision tree was developed to estimate the net cost savings over six months associated with the reduction in pressure ulcers taken from the cohort study. The authors stated that the perspective was that of the nursing and rehabilitation centres.

Effectiveness data:
The key effectiveness input was the incidence of pressure ulcers. Residents included in the study were prospectively followed for six months to determine the six-month incidence of pressure ulcers in the randomly assigned intervention and control groups. Rates were calculated using weekly skin records completed by nursing staff. In addition, a six-month retrospective review of facility-acquired pressure ulcers was completed to determine the pressure ulcer incidence rate for a historical control group.

Monetary benefit and utility valuations:
Measure of benefit:
The health benefit was measured using the comparative reduction in the incidence of nosocomial pressure ulcers.

Cost data:
The direct cost of prevention (product costs), treatment costs and litigation costs were included in the decision model. Product costs included skin care and incontinence management products, and pressure-redistribution mattresses. Usage came from nursing maintained skin care records and facility skin care protocols. Product costs were based on manufacturer wholesale costs or a secondary source. Treatment costs included the weekly cost of labour, wound dressings, and supplies. Treatment use was estimated from a retrospective review of patient skin records (electronic), a two-week observation of a random sample of residents, and a support staff survey. Treatment and labour costs came from secondary sources. A national survey of attorneys was used to estimate the expected litigation costs against the nursing home for pressure ulcers. Costs were reported in 2010 US $.

Analysis of uncertainty:
A threshold analysis was completed, in which the incidence of pressure ulceration for PUPP in the decision model was altered (keeping the control incidence constant) to identify the threshold where the expected cost of control-treated residents was equivalent to the expected cost of PUPP.

Results
The pressure ulcer incidence rate was 12% in the Pressure Ulcer Prevention Program (PUPP) group and 36% in the control group over six months. Compared with the historical control group pressure ulcer incidence rate (25.2%), PUPP resulted in a (statistically significant) 52% reduction in ulcers; compared with the study control group, PUPP resulted in a 67% reduction in ulcers in moderate to very-high risk patients.

Using the decision model, the expected six-month cost per moderate to very-high risk patient in the institution was $1,130 in the PUPP group and $1,928 in the study control group, with an average cost saving of $798 per moderate to very-high risk patient over six-months.

The threshold analysis showed that the PUPP pressure ulcer incidence would have to increase by 61% to 0.31 to provide equivalent costs in the PUPP group compared with the study control group. Compared with the historical control, a 35% increase in PUPP incidence was required for equivalent costs.

Authors’ conclusions
The authors concluded that the Pressure Ulcer Prevention Program (PUPP) resulted in a significant reduction in pressure ulcer incidence compared with standard care, and was more cost efficient.

CRD commentary
Interventions:
Comprehensive details of the intervention and comparators were clearly reported. The most appropriate comparator, standard care, was included in the analysis. No other relevant alternative interventions were discussed.

Effectiveness/benefits:
The effectiveness estimates, and the methods used to derive them, were clearly reported. Future effects were not discounted, which was reasonable given the short time horizon. Given the likely impact on patients’ quality of life, inclusion of a quality of life measure would have provided a more comprehensive assessment of the benefit of the intervention. The centres participating in the trial were selected based on their need to improve quality and safety indicators; these factors may make the results obtained less generalisable to other settings. The selection and randomisation of patients was sufficient, but it was not clear if the lack of blinding could have introduced bias.

Costs:
The included costs were appropriate for the adopted perspective, but the cost of training was not included in the analysis. Since PUPP included a unique training component, the lack of inclusion of this cost may have underestimated the cost of the intervention. The costs and their sources were clearly reported. The costs were specific to the setting.
Future costs were not discounted, which was reasonable for the short time horizon. Costs were appropriately inflated to 2010 prices.

The authors stated that the cost of hospitalisation was not included because it was not applicable to the nursing facilities; this narrow perspective assumption may limit the usefulness of the results. The authors recommended that future studies should assess the cost impact to the hospital and payer, which the authors hypothesised would be very large.

**Analysis and results:**
The decision model was clearly described including a diagram. Results of the analysis were clearly reported. Key details of the clinical trial, including the study design, patient characteristics and inclusion criteria, were clearly reported. An appropriate method of randomisation was used to assign participants to treatment groups. A possible limitation of the study was the short time horizon and the selection of centres. If significant differences in costs and health effects could be expected beyond six months, the time horizon may have been inadequate to assess the cost-effectiveness of the intervention.

Only a limited threshold analysis was completed. As such, it was not possible to make any definitive conclusions on the robustness of the results. Ideally, a multivariate deterministic or probabilistic sensitivity analysis that assessed the effect of single or joint parameter uncertainty on the results should have been completed.

**Concluding remarks:**
The study methodology and reporting was adequate. The authors' conclusions appear to be appropriate, but the robustness of the results is unclear.

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