



Review

A systematic review of economic evaluations assessing interventions aimed at preventing or treating pressure ulcers



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ARTICLE INFO

Article history:

Received 25 July 2013

Received in revised form 10 June 2014

Accepted 12 June 2014

Keywords:

Economic evaluations

Pressure ulceration

Wound care

Systematic review

ABSTRACT

Background: Pressure ulcers have an adverse impact on patients and can also result in additional costs and workload for healthcare providers. Interventions to prevent pressure ulcers are focused on identifying at risk patients and using systems such as mattresses and turning to relieve pressure. Treatments for pressure ulcers are directed towards promoting wound healing and symptom relief. Both prevention and treatments have associated costs for healthcare providers.

The aim of this study was to systematically review the economic evidence for prevention and treatment interventions for pressure ulcers.

Design: A systematic review of comparative clinical studies that evaluate interventions to either prevent or treat pressure ulcers.

Data sources: Searches of the major electronic databases were conducted to identify citations that reported costs or economic analysis for interventions directed towards prevention or treatment of pressure ulcers. Only comparative clinical studies were included. Review articles, case-series, non-randomised studies, and studies in a foreign language that did not have an abstract in English were excluded from the review.

Review methods: Decisions regarding inclusion or exclusion were based on a consensus of the authors after review of the title or abstract. Potential citations were obtained for more detailed review and assessed against the inclusion criteria.

The studies identified for inclusion were assessed against the 24 key criteria contained in the CHEERS checklist. Costs were standardised to US dollars and adjusted for inflation to 2012 rates.

Results: The searches identified 105 potential studies. After review of the citations a total of 23 studies were included: 12 examined prevention interventions and 11 treatments. Review against the CHEERS criteria showed that the majority of included trials had poor reporting and a lack of detail regarding how costs were calculated. Few studies reported more than aggregate costs of treatments with only a small number reporting unit cost outcomes.

Conclusions: Existing evidence was poor in regard to the economic evaluation of interventions for the prevention and treatment of pressure ulcers. Much of the published literature had poor reporting quality when compared to guidelines which provide key criteria for studies to adequately examine costs within an economic analysis.

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What is already known about the topic?

- Pressure ulcers are costly in terms of their impact on resources and patient morbidity.
- There are a number of different products and strategies available for the prevention and treatment of pressure ulcers.
- Economic analyses help funders in their decisions between alternate interventions.
- Best practice checklists and consensus statements are available for economic analyses.

What this paper adds

- The paper is currently the only study that has evaluated the published studies describing interventions for the prevention and treatment of pressure ulcers.
- Prevention strategies are a more cost-effective strategy than treatment of pressure ulcers.
- The current economic evidence for pressure ulcers is poorly reported.

1. Background

Pressure ulcers are a “localised injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear” (National Pressure Ulcer Advisory Panel and European Pressure Ulcers Advisory Panel, 2009). They are graded based on the depth and damage to the skin and surrounding tissues (Beeckman et al., 2007). This grading also influences the treatment choices and actions required of clinicians. One illustration of this is the requirement by the UK Department of Health, via the National Patient Safety Agency, that all ulcers Grade 3 and over must be fully investigated and their causal factors determined (National Patient Safety Agency, 2011).

Pressure ulcers impact patients, families and clinicians in many different ways. They impact patients by reducing their quality and length of life. They also cause distress to their relatives and caregivers (Moore and Cowman, 2009; Sorenson and Lyons, 2009). Pressure ulcers affect clinical staff in terms of increased workload linked to documentation, treatment, prevention and collection of data. Pressure ulcers are associated with increased costs and resource use, which impact healthcare systems (Bennett et al., 2004; Brem et al., 2010; Stinson et al., 2013). Finally, they are also being considered as a proxy by regulators as an overall indicator of quality of care (Mueller and Karon, 2004).

2. Prevention and treatment of pressure ulcers

The primary focus of interventions related to pressure ulcers should be towards prevention as this is less costly for healthcare providers and less traumatic for the patient (Reddy et al., 2006). The principle aim of interventions to prevent pressure ulcers are focussed on identifying patients at risk of ulceration, reducing pressure and minimising shear and friction that contribute to pressure ulcer development (Reddy et al., 2006). The main assessment tools used within the UK, Europe and North America

are the Braden (Braden and Bergstrom, 1994) and Waterlow scales (Waterlow, 1991). These tools are based on scoring algorithms of factors associated with pressure ulcer development and seek to identify those patients at high risk of pressure ulcer development. Interventions to relieve pressure and prevent ulcers can then be applied. Common prevention interventions include turning regimes, pressure relieving beds and mattresses, as well as off-loaders for heels. Unfortunately, the evidence to support the majority of these interventions has been referred to as equivocal at best, and absent at worst, with few high quality comparative effectiveness studies (Reddy et al., 2006). Some of the interventions such as two hourly turns are based on tradition rather than empirical evidence (Defloor et al., 2005) and the pressure relieving equipment may not have been evaluated in terms of their costs and benefits.

Once a pressure ulcer has occurred the main treatments are focussed towards promoting wound healing through the application of various types of wound dressings. Such dressings may also help with wound debridement, reduce bacterial load and prevent further trauma. However, unless the underlying causes and risk factors (i.e. pressure, shear and friction) are addressed, the treatments are likely to be ineffective. Systematic reviews have criticised the evidence for the effectiveness of such dressings for pressure ulcers as being of poor quality (Bouza et al., 2005).

One important consideration for healthcare providers has been the impact that pressure ulcers have on the cost of health care. One study, frequently quoted in the UK, was conducted by Bennett et al. in 2004 and estimated that the cost of pressure ulceration was up to 4% of UK NHS expenditure and was between £1.4 and £2.1 billion per year. It was also estimated that an average district general hospital in the UK spent anywhere between £600,000 and £3 million on treating pressure ulcers each year; however, this estimate is 20 years old (Touche Ross, 1994). More recently, researchers found the cost per admission for hospital acquired grade 4 pressure ulcers to be on average \$129,248 USD (Brem et al., 2010). In all these estimates, the main cost driver is the amount of nursing time involved in the care of this group of patients related to treatment of complications such as wound infection. Therefore, understanding the attributable costs of prevention and treatment of pressure ulcers may help in the implementation of effective strategies in clinical practice.

Economic analyses have become increasingly important as a basis for deciding between treatments and interventions. Economic analyses are concerned with evaluating the consequences of alternative interventions in order to make choices in a world with limited resources (Frick et al., 2013; Freund and Dittus, 1992). There are four different types of economic analyses: cost-minimisation, cost-effectiveness, cost-utility and cost-benefit. Cost-minimisation is an appropriate analysis when the outcomes for the interventions being compared are the same and is used to identify the least costly alternative (Briggs and O'Brien, 2001). Cost-effectiveness studies measure cost on the basis of a single consequence in terms of cost per unit. For example, cost per pressure ulcer prevented or cost per life year gained. Cost-effectiveness analyses results are usually expressed in

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