Evaluation of the cost-effectiveness of electrical stimulation therapy for pressure ulcers in spinal cord injury

Mittmann N, Chan BC, Craven BC, Isogai PK, Houghton 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.

CRD summary
This study assessed the cost-effectiveness of electrical stimulation, added to standard wound care, for the treatment of grade III or IV pressure ulcers, in patients with a spinal cord injury. The authors concluded that the addition of electrical stimulation to usual care improved healing rates, reduced costs, and appeared to be cost-effective, over one year, from the perspective of the Canadian public payer. The cost-effectiveness methods were valid, which ensures that the authors’ conclusions are robust.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study assessed the cost-effectiveness of electrical stimulation, added to standard wound care, for the treatment of grade III or IV pressure ulcers, in patients with a spinal cord injury.

Interventions
Electrical stimulation plus standard wound care (usual care) was compared against usual care alone.

Usual care was mainly non-surgical procedures, such as debridement, dressing, nutrition, or physical therapy, as well as surgical procedures for the management of complications.

Electrical stimulation involved the delivery of a low-level current, through surface electrodes on the area of the wound bed, for three months.

Location/setting
Canada/community (home).

Methods
Analytical approach:
The analysis was based on a model, with a one-year time horizon. The authors stated that it was carried out from the perspective of the Canadian public health system payer.

Effectiveness data:
A literature review was undertaken to identify valid sources for the inputs. The key input was the proportion of patients who were completely healed with each treatment. These data were from 29 patients enrolled in a randomised controlled trial. The probability of relapse was from an observational study conducted in the USA. Other data were from published studies. Key assumptions were made and the most important one was that the healing rates observed at three months in the clinical trial remained constant for one year.

Monetary benefit and utility valuations:
Not considered.

Measure of benefit:
The summary benefit measure was the rate of pressure ulcers that were healed.
Cost data:
The economic analysis included the costs of electrical stimulation, usual care, community care access, surgical procedures, and complications due to pressure ulcers, including hospitalisation. The electrical stimulation costs were from the main clinical trial and included equipment and supplies, as well as the travel time and fees paid to a specialist to provide bedside training at home to caregivers. Standard wound care costs included an interdisciplinary team assessment, pressure relieving devices, nutritional counselling, monthly reassessments, laboratory analysis, and patient transport. The costs of surgical procedures and hospitalisations were from official Canadian sources. All costs were in Canadian dollars (CAD) and the price year was 2009.

Analysis of uncertainty:
One-way sensitivity analyses were carried out on the model inputs, using their values increased or decreased by 25%. A probabilistic sensitivity analysis was performed, using Monte Carlo simulation and predetermined probability distributions for the model inputs. Cost-effectiveness acceptability curves were created.

Results
The expected one-year cost was CAD 29,549 with electrical stimulation, and CAD 29,773 with usual care. The rate of pressure ulcers healed per year was 0.208 with electrical stimulation, and 0.045 with usual care.

Electrical stimulation plus usual care was dominant as it was more effective and less expensive than usual care alone.

Electrical stimulation was dominant in 61.5% of simulations. If society was willing to pay CAD 4,000 per pressure ulcer healed, electrical stimulation was cost-effective in 81% of simulations. If the willingness to pay was CAD 50,000 per pressure ulcer healed, it was cost-effective in 96% of simulations.

The rate of pressure ulcers healed with electrical stimulation plus usual care was the key driver for the model, but electrical stimulation remained cost-effective in all one-way scenarios.

Authors’ conclusions
The authors concluded that the addition of electrical stimulation to usual care improved healing rates, reduced costs, and appeared to be cost-effective for spinal cord injury patients with grade III or IV pressure ulcers, over one year, from the perspective of the Canadian public payer.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the addition of the proposed intervention was compared against the usual approach for the patient population.

Effectiveness/benefits:
The authors stated that a literature review was carried out, but its methods were not reported. The sample size and design of the clinical trial that provided the main efficacy data were provided. The authors stated that a meta-analysis of studies was not possible given the high heterogeneity between those found. They acknowledged that using one study, with a small sample, for the efficacy data could have limited the analysis. The extrapolation of the efficacy data from three months to one year, was based on authors' assumptions as no data were found. Little information on other sources of clinical parameters was provided. Extensive sensitivity analysis was conducted on the key model parameters. The summary benefit measure was disease specific and will not allow comparisons to be made with the benefits of other health care interventions. The authors acknowledged that quality-adjusted life-years would have been more relevant, but no published utility weights were found.

Costs:
The cost categories reflected the perspective of the public payer as stated by the authors. The resource use and costs for the interventions were collected in detail during the clinical trial. Other data were from standard Canadian sources, such as an Ontario database. The unit cost and resource quantities were presented separately for most items and the key cost categories were varied in the sensitivity analysis.

Analysis and results:
The results were clearly reported. An incremental approach was used to compare the costs and benefits of the two strategies, and electrical stimulation was dominant in the base case. The uncertainty was investigated in both deterministic and probabilistic analyses and the methods and results were clearly illustrated. The authors did not discuss the transferability of their results and they appear to be specific to Canada, but might be relevant to settings with similar cost structures.

Concluding remarks:
The cost-effectiveness methods were valid, which ensures that the authors’ conclusions are robust.

Funding
Supported by the Ontario Neurotrauma Foundation and Reseau provincial de recherche en adaptation-readaptation, Canada.

Bibliographic details

PubMedID
21621661

DOI
10.1016/j.apmr.2010.12.038

Original Paper URL

Indexing Status
Subject indexing assigned by NLM

MeSH
Cost-Benefit Analysis; Decision Support Techniques; Decision Trees; Electric Stimulation Therapy /economics; Humans; Length of Stay; Pressure Ulcer /etiology /therapy; Quality-Adjusted Life Years; Spinal Cord Injuries /complications; Surgical Flaps; Wound Healing

AccessionNumber
22011001605

Date bibliographic record published
02/11/2011

Date abstract record published
21/02/2012