Cost-effectiveness of supervised exercise therapy in heart failure patients
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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
The study investigated the cost-effectiveness of a supervised exercise therapy intervention for patients with heart failure. The authors concluded that, despite the modest benefits of exercise therapy based on available evidence, the cost-effectiveness was acceptable for health policy decision makers in Brazil. The methods, analyses and results were mostly transparent and comprehensive. The authors’ conclusions appear to be a thorough assessment of the study findings.

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

Study objective
The aim of the study was to examine the cost-effectiveness of a supervised exercise intervention for patients (mean age 60 years) with clinically stable heart failure (New York Heart Association heart failure class II and III).

Interventions
Supervised exercise therapy plus standard care was compared with standard care alone. The supervised exercise sessions were conducted in an out-patient facility with qualified exercise training professionals (such as physiotherapists). Exercise sessions consisted of initial warm-up, then 15 to 30 minutes of aerobic training on a treadmill or cycling machine; programmes were individually tailored. Patients attended four sessions for 12 weeks, followed by weekly maintenance sessions at a rehabilitation centre. Standard care was treatment with heart failure medications.

Location/setting
Brazil/secondary care

Methods
Analytical approach:
A Markov model was used to synthesise evidence from published studies, epidemiological data and hospital patient-level records. The time horizon was 10 years (with yearly cycles). The authors stated that a third-party (government) payer perspective was adopted.

Effectiveness data:
The key clinical outcomes were survival rates and hospitalisations (separate and combined). A systematic review and meta-analysis was performed which included 13 trials. Pooled risk ratios were calculated for mortality and hospitalisation using a fixed-effect model. A survival curve was estimated (with a Weibull function) using patient-level data from a Brazilian heart failure outpatient clinic; this cohort was followed over a median 75 months (Beck-da Silva L, et al. 2009, see ‘Other Publications of Related Interest’ for bibliographic details).

Monetary benefit and utility valuations:
Utility estimates were based on a key published report with recommended values for heart failure New York Heart Association severity classification (Gohler, et al. 2009, see ‘Other Publications of Related Interest’ for bibliographic details). The utilities were weighted by New York Heart Association class prevalence in a Brazilian hospital population.

Measure of benefit:
Life-years and quality-adjusted life years (QALYs) were the summary benefit measures. These were discounted at an
annual rate of 5%.

Cost data:
Direct exercise intervention costs included staff salaries, facility maintenance, and equipment costs (cycle ergometers, pulse oximeters). Standard heart failure treatment included hospitalisation, ambulatory, medication and investigation costs. Published sources were used to value the intervention- and treatment-related costs. Costs were presented in international dollars (INT$) and converted to Brazilian reais using purchasing power parities. The price year was 2008. Costs were discounted at an annual rate of 5%.

Analysis of uncertainty:
The model parameters were tested with one-way, two-way and probabilistic sensitivity analyses. One-way sensitivity analyses were performed on key parameters (mortality and hospital reductions with exercise, hospitalisation rate, discount rate, heart failure utility and costs). For probabilistic sensitivity analysis, 1,000 simulations were run on model parameters in a Monte Carlo simulation. Results were illustrated using a cost-effectiveness acceptability curve and scatter plot.

Results
The total discounted cost of standard treatment alone was INT$ 12,720 compared with INT$ 15,331 for standard treatment plus supervised exercise therapy. The mean QALYs for standard treatment alone were 4.36 compared with 4.46 QALYs for standard treatment plus supervised exercise therapy. The incremental cost-effectiveness ratio (ICER) per QALY for conventional treatment plus supervised exercise therapy compared with conventional treatment alone was INT$ 26,461. The ICER per life-year saved was similar (INT$ 21,169).

One-way sensitivity analyses showed that the base results were most sensitive to: mortality reduction with exercise (ICER INT$ 66,576 per QALY); hospitalization reduction with exercise (ICER INT$ 36,245 per QALY); and annual cost of the intervention (INT$ 889 per year, INT$ 52,056 per QALY).

The authors stated that supervised exercise therapy for patients with heart failure had a 55% likelihood of being cost-effective at a threshold of INT$ 27,500 (three times Brazil’s gross domestic product per year).

Authors' conclusions
The authors concluded that, despite the modest benefits of exercise therapy for patients with heart failure based on available evidence, there was an acceptable cost-effectiveness ratio for the health policy decision makers in Brazil.

CRD commentary
Interventions:
The structure of the exercise intervention was well-described. Heart failure patients who received the exercise intervention needed dedicated commitment and participation; the facilities and rehabilitation resources available in other settings would need to be assessed.

Effectiveness/benefits:
The clinical effectiveness estimates were based on a systematic review and meta-analysis of 13 trials undertaken by the authors. Brief details of the review were provided; it appeared that the best available evidence was used. This evidence produced a wide variation in the modelled values for risk reduction in deaths and hospitalisation. Life years and QALYs were appropriate measures of benefit, as they allowed comparisons with other disease interventions. No details of the heart failure utility measurement and valuation methods were reported, so the validity of the source paper could not be assessed. It was unclear why a utility decrement for hospitalisation was not used; worsening heart failure that needed hospitalisation may have been captured in the New York Heart Association driven utility values.

Costs:
It appeared that relevant costs were included for the third-party (government) payer perspective used. The resource quantities and unit costs were clearly presented. The measurement of these resources and the sources used appeared to be reasonable and fully reported. Unit costs were based on published and available sources. The price year, time horizon, currency details, discount rate were reported.
Analysis and results:
Cost and outcome information were synthesised using a Markov model. Appropriate details of the model structure were provided, including a diagram. Model parameter uncertainty was appropriately assessed; the sensitivity results were well-illustrated and clearly demonstrated the extent of variation in changes to key variables and model parameters. The results were compared with other exercise therapy trials. The controversial nature of this research base in unravelling the true effect size was discussed and compared with other reports. The mean age of the included population was 60 years; this may have underestimated the general age outside clinical trial conditions, which may be closer to 70 years. The authors acknowledged limitations including the assumption of constant effectiveness over 10 years, uncertain heart failure treatment costs, and broad variance in the exercise effectiveness estimates. These factors were not considered to significantly impact on the stability of the results.

Concluding remarks:
The methods, analyses and results were mostly transparent and comprehensive. The authors’ conclusions appear to be a thorough assessment of the study findings.

Funding
The study was supported by the Brazilian Institute for Health Technology Assessment.

Bibliographic details

PubMedID
21839879

DOI
10.1016/j.jval.2011.05.006

Original Paper URL
http://www.valueinhealthjournal.com/article/S1098-3015(11)01422-7/abstract

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Aged; Ambulatory Care /economics; Brazil; Computer Simulation; Cost-Benefit Analysis; Evidence-Based Medicine; Exercise Therapy /economics; Health Care Costs; Heart Failure /diagnosis /economics /mortality /physiopathology /rehabilitation; Hospitalization /economics; Humans; Markov Chains; Middle Aged; Models, Economic; Monte Carlo Method; National Health Programs /economics; Outcome and Process Assessment (Health Care) /economics; Quality-Adjusted Life Years; Severity of Illness Index; Survival Analysis; Survival Rate; Time Factors; Treatment Outcome

AccessionNumber
22011001674

Date bibliographic record published
22/02/2012

Date abstract record published
26/07/2012