Cost-effectiveness of aldosterone antagonists for the treatment of post-myocardial infarction heart failure


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 objective was to assess the cost-effectiveness of eplerenone versus spironolactone. The authors concluded that eplerenone appeared more cost-effective than spironolactone for treatment of post-myocardial infarction heart failure. The study methodology was good. Methods and results were reported adequately. The authors’ conclusions appear valid and include a caveat regarding the level of uncertainty.

Type of economic evaluation
Cost-utility analysis

Study objective
The study objective was to assess the cost-effectiveness of aldosterone antagonists for the treatment of patients with heart failure following a myocardial infarction.

Interventions
Two interventions, eplerenone and spironolactone, were compared as adjunctive therapy to standard care in patients with post-myocardial infarction heart failure.

Location/setting
UK/Outpatient secondary care.

Methods
Analytical approach:
A decision analytic Markov model was used to assess costs and outcomes associated with the two interventions under study. The model was developed in discussion with two clinical advisors. The time horizon of the study was the lifetime of the patient. The authors reported that the perspective adopted in the economic analysis was that of the UK National Health Service (NHS) and personal social services (PSS).

Effectiveness data:
Clinical and effectiveness data were derived from previously published studies. The main measure of effectiveness was all-cause mortality and hospitalisations for cardiovascular causes. These estimates were derived from a comprehensive systematic review and indirect meta-analysis. Relevant studies were identified from a search of 18 electronic databases. The review was supplemented by a recent systematic review (see Other Publications of Related Interest). The analysis was undertaken using Bayesian meta-regression methods. These methods allowed the full evidence base of trials in both the post-myocardial infarction heart failure population and the general heart failure population to be utilised.

Monetary benefit and utility valuations:
Utility estimates for people with heart failure were obtained from a study in which patients enrolled in a clinical trial were followed-up using the EQ-5D. To reflect the decreasing utility of patients as they aged, the authors used UK age- and sex-adjusted norms adjusted downward by approximately 5% to reflect the existence of heart failure.

Measure of benefit:
The measure of benefit was quality-adjusted life-years (QALYs). As benefits could be generated over the lifetime of the patient, future benefits were discounted using an annual rate of 3.5%.
Cost data:
The direct costs included in the study were for medications and costs of treating cardiovascular events (such as acute myocardial infarction, heart failure, stroke and ventricular arrhythmia). Costs of medications were obtained from the British National Formulary. Costs of treating most cardiovascular events were obtained from the National Schedule of Reference Costs for NHS trusts. Costs for heart failure were obtained from a British Heart Foundation report. The price year was 2007/08. Costs could be incurred over the lifetime of the patient so future costs were discounted using an annual rate of 3.5%. All costs were reported in UK pounds sterling (£).

Analysis of uncertainty:
The model was run probabilistically by using Monte Carlo simulation. Uncertainty in the parameters was characterised by probability distributions. Results were presented using a cost-effectiveness acceptability curve. A value of information analysis was performed to quantify the cost associated with the decision uncertainty.

Results
Mean QALYs gained with lifetime treatment were 4.5981 with standard care, 4.6196 with spironolactone and 5.1108 with eplerenone.

Mean costs per patient with lifetime treatment was £4,130 with standard care, £4,446 with spironolactone and £8,177 with eplerenone.

Costs and benefits were combined using an incremental cost-utility ratio (additional cost per QALY gained). Spironolactone was found to be extendedly dominated by standard care and eplerenone (one alternative was more expensive but had a lower incremental cost-utility ratio). Compared with standard care, eplerenone was associated with an incremental cost-utility ratio of £7,893 per QALY gained.

Results of the probabilistic sensitivity analysis showed that at a willingness to pay threshold of £10,000 per QALY gained the probability that eplerenone was cost-effective was 44.3%, at a willingness to pay threshold of £20,000 the probability was 62.5% and at £30,000 the probability was 65.1%. Results of two-year and lifetime analyses showed a high level of decision uncertainty as the threshold increased.

Authors' conclusions
The authors concluded that eplerenone appeared to be more cost-effective than spironolactone for treatment of post-myocardial infarction heart failure; the findings remained subject to important uncertainties regarding the effects of treatment on major clinical outcomes.

CRD commentary
Interventions:
The interventions were reported adequately. One comparator included in the indirect evidence synthesis was excluded from the modelling as it was not licensed for use in the UK.

Effectiveness/benefits:
Clinical and effectiveness data were derived from previously published studies. The main measure of effectiveness was derived from a systematic review of the literature with sources from 18 electronic databases supplemented by a previously published systematic review. It was highly likely that all major relevant evidence was considered for inclusion in the model. Effect estimates were derived using Bayesian meta-analysis (details were provided). This type of analysis enables all relevant data to be incorporated in estimating relative treatment effects where head-to-head trails are lacking. The methods used were well reported and seemed appropriate.

Costs:
The authors reported that the perspective adopted in the economic analysis was that of the NHS and PSS. It appeared that all major relevant cost categories and costs for this perspective were included in the analysis. Cost sources were reported adequately. Price year, time horizon and discount rate were all stated clearly; this aided transparency and generalisability.

Analysis and results:
Cost and clinical information were synthesised using a decision analytic Markov model. The model structure was reported adequately. A graphical depiction of the model was provided. The impact of uncertainty on the results was tested exhaustively using a probabilistic sensitivity analysis and value of information analysis. The authors reported that indirect comparisons were necessary in the absence of head-to-head trials of spironolactone and eplerenone.

Concluding remarks:
The study methodology was good. Methods and results were reported adequately. The authors' conclusions appear valid and include a caveat regarding the level of uncertainty.

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