The costs of treating acute heart failure: an economic analysis of the SURVIVE trial

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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 objective was to estimate the cost-effectiveness of levosimendan compared with dobutamine, in the treatment of acute heart failure. The authors concluded that levosimendan could be cost-effective compared with dobutamine, at an acquisition cost of 600 Euros per vial and at a willingness to pay of 15,000 Euros per life-year gained or more. The methodology appears to have been appropriate and, on the whole, was clearly and transparently reported. The conclusions reached by the authors appear to be appropriate.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to assess the incremental cost per life-year gained for levosimendan compared with dobutamine, in the treatment of acute heart failure.

Interventions
This study investigated the use of levosimendan and dobutamine.

Location/setting
France, Germany, UK, Austria, Finland, Israel, Latvia, Poland and Russia/in-patient secondary care.

Methods
Analytical approach:
The efficacy and resource use data were derived from the Survival of Patients with Acute Heart Failure in Need of Intravenous Inotropic Support (SURVIVE) trial. For more details on the trial, the authors referred readers to Mebazaa, et al. 2007 (see ‘Other Publications of Related Interest’ below for bibliographic details). The authors stated that the perspective was that of the health care decision makers in western Europe.

Effectiveness data:
The effectiveness data were derived from the SURVIVE randomised controlled trial (RCT). This trial enrolled 1,327 patients, with 664 in the levosimendan group and 663 in the dobutamine group, at sites in nine countries. These patients were followed-up for 180 days. The primary outcome was the 180-day mortality.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Life-years gained were the measure of benefit.

Cost data:
The direct costs included those of hospitalisation, which included both the initial hospitalisation and re-hospitalisations occurring during the 180 day follow-up, and the drugs. The hospitalisations and length of stay were derived from the clinical case report forms. The unit costs per bed-day were derived from published national payment schedules for France, Germany and the UK. The costs for patients enrolled from other nations were based on the unit cost per bed-day averaged across France, Germany and the UK. The price year was 2005 and all costs were reported in Euros (EUR) and adjusted for purchasing power parities.
Analysis of uncertainty:
A one-way sensitivity analysis was performed, using the survival data from both the Cooperative North Scandinavian Enalapril Survival Study placebo and treatment groups. As the future price of levosimendan was uncertain, the authors provided cost-effectiveness results for different drug prices. In addition, the authors reported that the incremental cost-effectiveness was calculated using bootstrapping, where the patient-level costs and survival for each group were re-sampled 1000 times. In addition, a separate analysis was performed which excluded those with a baseline systolic blood pressure under 100mmHg or diastolic blood pressure under 60mmHg, in accordance with levosimendan advice at the time.

Results
The survival at 180 days was 78.2% for levosimendan and 77.0% for dobutamine (hazard ratio: 0.93, p=0.62, 95% confidence interval, CI: 0.71 to 1.22).

The average costs incurred over the 180 day trial period were EUR 5,396 for levosimendan (this cost estimate did not include the costs of the intervention drug) and EUR 5,275 for dobutamine (p=0.96, mean difference: EUR 121, 95% CI: -238 to 658).

With an acquisition cost of EUR 600 per vial for levosimendan, there was more than a 50% probability that levosimendan was cost-effective over dobutamine at a willingness to pay of EUR 15,000 per life-year gained or more. If the price of levosimendan was increased to EUR 800, the 50% probability would occur at a willingness to pay of about EUR 17,000 per life-year gained.

Excluding patients with low baseline blood pressure, resulted in a decrease in the costs for levosimendan.

Authors' conclusions
The authors concluded that their results offered preliminary evidence that levosimendan may be cost-effective compared with dobutamine at an acquisition cost of EUR 600 per vial and at a willingness to pay of EUR 15,000 per life-year gained or more.

CRD commentary
Interventions:
The interventions were reported, but no dosage information was given. A justification was given for using dobutamine as the comparator, which was that it represented the usual care.

Effectiveness/benefits:
The effectiveness data were derived from a RCT, which was appropriate. Well conducted RCTs are considered to be the gold standard study design when comparing health interventions. Although the authors stated that life-years gained over the lifetime of the patient was the main benefit measure, only the mortality rates at 180 days were reported. In addition, the authors did not report whether the future life-years gained were discounted or not.

Costs:
The authors reported that the perspective was that of the European decision makers. However, they only included the costs of hospitalisation and drugs and did not include those of primary care visits, accident and emergency visits, out-patient visits, and community care. In addition, although survival benefits were extrapolated over the lifetime of the patient, the impact of the intervention on future costs was not, with the analysis being based solely on the 180 day trial follow-up period. The authors adequately reported how the resource use data was estimated and the sources for the unit costs. They also adequately reported the price year, and converted all the costs into a single currency, taking into account the price differentials of the nine countries.

Analysis and results:
The authors did not present the average incremental cost-effectiveness ratio, mainly because the price of levosimendan was uncertain. However, they did present the probability of the intervention being cost-effective at different prices and willingness to pay thresholds. The uncertainty in the results was adequately investigated using a series of sensitivity analyses. Overall, the methods were well reported. The results were reported in detail and in their discussion the authors
appropriately noted the limitations of their study.

**Concluding remarks:**
The methodology appears to have been appropriate and, on the whole, was clearly and transparently reported. The conclusions reached by the authors appear to be appropriate.

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**Other publications of related interest**


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