Echocardiographic risk stratification for early surgery with endocarditis: a cost-effectiveness analysis


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 examine the cost-effectiveness of using echocardiography, compared with clinical factors (standard care), for the diagnosis of infective endocarditis (IE) in high-risk patients with IE. The analysis demonstrated that echo-guided risk stratification for early surgery in patients with large vegetation was a cost-effective strategy for IE in the USA. The study was characterised by poor reporting of the cost data and clinical sources, therefore the authors’ conclusions should be treated with some caution.

Type of economic evaluation
Cost-utility analysis

Study objective
The primary objective of the study was to examine the cost-effectiveness of using echocardiography for the diagnosis of infective endocarditis (IE), in comparison with diagnosis based on clinical factors (standard care), in high-risk patients with IE (as defined by the Duke criteria) and a transthoracic or transoesophageal echocardiogram documenting left-sided valve involvement.

Interventions
With standard care, patients underwent surgery during index hospitalisation for typical clinical indications such as congestive heart failure, recurrent embolic events, severe valvular regurgitation and persistent bacteremia. All other patients received medical therapy.

With echocardiography, all patients with high-risk echocardiographic features underwent early surgery. Specifically, patients with vegetations measuring $>$10 mm in the longest dimension were considered high risk and underwent early surgery. Patients with low-risk echocardiographic features underwent surgery for standard clinical indications.

Location/setting
USA/hospital.

Methods
Analytical approach:
This economic evaluation was based on a decision tree and a Markov analysis. Short-term outcomes with the two options under analysis were assessed in the standard decision tree, while their long-term cost-effectiveness was examined using the Markov model. The time horizon was 50 years and the models considered a patient aged 55 years until death or 105 years. The authors stated that a societal perspective was adopted in the study.

Effectiveness data:
The clinical estimates came from a selection of known relevant studies. Specifically, data were obtained from the medical literature, when available, and from institutional specific databases such as the Duke Endocarditis Database. The authors did not report the design of the included studies, but stated that the quality of the estimates often varied widely among the published evidence. In addition, retrospective data from a single-centre experience were employed in situations where no literature-based estimates were available. Age-specific survival came from life tables.

Monetary benefit and utility valuations:
Utility valuations were derived from the medical literature. The utility weights for each health state were reported, but.
no other details.

Measure of benefit:
The summary benefit measure was the quality-adjusted life-years (QALYs). These were estimated using the decision model. No discounting was applied.

Cost data:
The analysis of the costs included the health services associated with hospitalisation and annual follow-up. A breakdown of the cost items was not given. The costs and the quantities related to hospital stay were derived from a sample of patients hospitalised at the Duke Medical Center for IE between 1997 and 2003. Other costs were derived from published sources. The price year was 2003. The costs were in US dollars ($). An annual discount rate of 3% was applied to future costs.

Analysis of uncertainty:
One- and two-way sensitivity analyses were undertaken on model inputs. Published ranges of values appear to have been used.

Results
The expected long-term costs were $47,766 with standard care and $53,669 with the echo-guided strategy (difference $5,902).

The expected QALYs were 5.078 with standard care and 5.45 with the echo-guided strategy (difference: 0.247).

The incremental cost per QALY gained with the echo-guided strategy over standard care was $23,867.

The sensitivity analysis showed that, for most of the scenarios considered in the sensitivity analysis, the incremental cost per QALY of the echo-guided strategy remained the commonly cited threshold of $50,000 per QALY. The most influential variable was the baseline (nonsurgical) risk for stroke without echo-stratification. When this rate was set at 2% (it was 7% in the base-case model), the incremental cost per QALY rose to $79,570, making the echo-guided strategy not cost-effective. The threshold value was 3.65% and, at a stroke risk between 3.65% and 14%, the incremental cost per QALY for the echo-guided strategy was lower than $50,000. The echo-guided strategy became dominant for a stroke risk higher than 18.3%.

Authors’ conclusions
The authors concluded that echo-guided risk stratification for early surgery in patients with large vegetation was a cost-effective strategy for IE in the USA. The authors stated that clinical trials should be performed to further investigate the cost-effectiveness of echo-guided risk stratification in IE.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear since the new intervention was compared against standard care in the authors’ setting. They are likely to represent relevant strategies in many health care systems.

Effectiveness/benefits:
There was little information on the approach used to identify the primary sources of data, and it was not stated whether a review of the literature was performed. Thus, the primary studies might have been identified selectively. Furthermore, the authors did not describe the types of sources used, although they stated that the quality of some studies was low and that randomised studies would be required in future. This means that it is not possible to judge the validity of these sources. Other aspects of using multiple sources, such as the issue of heterogeneity and the approach used to combine these data, were not discussed. Similarly, there were few details about the sources used to derive utility valuations. The use of discounting was not investigated despite the long time horizon of the analysis.

Costs:
The analysis of the costs appears to have been restricted to those services relevant to the health system rather than to...
The costs were presented as macro-categories, and the unit costs were not presented separately from the resource quantities. This limits the transparency of the economic analysis. The price year and the use of discounting were reported. The use of alternative cost assumptions was investigated in the sensitivity analysis.

Analysis and results:
The synthesis of the costs and benefits was appropriate. The issue of uncertainty was clearly addressed, although it was restricted to a deterministic approach. The results of both the base-case analysis and the sensitivity analyses were presented clearly and showed the most influential model inputs. The authors noted some limitations of the analysis, particularly related to the use of limited clinical evidence.

Concluding remarks:
Although the study results were reported in a comprehensive and transparent way, the authors’ conclusions should be treated with some caution given the lack of detail on the clinical sources of the analysis.

Funding
American Society of Echocardiography.

Bibliographic details

Other publications of related interest


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Subject indexing assigned by NLM

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