Cost-effectiveness of the Endeavor stent in de novo native coronary artery lesions updated with contemporary data

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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
This study assessed the costs and effects of the Endeavor drug-eluting stent, compared with the Driver bare-metal stent, for coronary interventions in patients with single-vessel disease. The authors concluded that the Endeavor stent was likely to be cost-effective, over four years and using conservative assumptions. The methods were satisfactory and they and the results were aptly reported. The authors’ conclusions appear to be appropriate.

Type of economic evaluation
Cost-utility analysis

Study objective
The aim was to assess the costs and effects of the Endeavor drug-eluting stent (DES), compared with the Driver bare-metal stent (BMS), for coronary interventions. The population was a hypothetical cohort of patients, with single-vessel disease and the characteristics and eligibility criteria of the participants in the Endeavor II clinical trial.

Interventions
The Endeavor DES was compared with the Driver BMS in their ability to reduce the risk of restenosis and other clinical outcomes, such as mortality, acute myocardial infarctions, and target-vessel revascularisations.

Location/setting
UK/secondary care.

Methods
Analytical approach:
A Markov model was used to synthesise the data from published clinical studies, reference databases, and an economic evaluation (Bagust, et al. 2006, see ‘Other Publications of Related Interest’ below for bibliographic details). The analysis was over a four-year period and the authors stated that the perspective was that of the UK NHS.

Effectiveness data:
The main clinical estimates, for the two strategies, were the major adverse cardiac events, which included deaths, acute myocardial infarctions, target-vessel revascularisations, and late stent thromboses. The pooled clinical data from the trials of the Endeavor programme supplied the cardiac events. The Endeavor II trial provided the efficacy of the Endeavor and Driver stents and this was supplemented with data from a second trial for the Driver stent (Stone, et al. 2007, see ‘Other Publications of Related Interest’ below for bibliographic details).

Monetary benefit and utility valuations:
The utility scores were from the economic evaluation (Bagust, et al. 2006), which based them on previous studies of patients with coronary artery disease.

Measure of benefit:
The measure of benefit was quality-adjusted life-years (QALYs) and these were discounted at an annual rate of 3.5%.

Cost data:
The direct medical costs were included for stent procedures, repeat procedures, and cardiac and cerebrovascular events.
The unit costs were from the British National Formulary, NHS Reference Costs 2005 to 2006, the stent manufacturer, and published studies. The costs were discounted at 3.5% per year and reported in 2007 UK pounds sterling (£); inflationary adjustments were made, where necessary.

Analysis of uncertainty:
The model parameters and assumptions were examined with one-way sensitivity analyses, varying the key parameters by ±20%. Probabilistic sensitivity analysis was performed to assess variations in the input data. The results were presented on a cost-effectiveness acceptability curve and a tornado diagram of the incremental net benefit.

Results
In the base case, over four years, the total discounted costs were £5,739 for the Endeavor DES compared with £5,636 for the Driver BMS. The discounted QALYs were 3.11 for the Endeavor DES and 3.08 for the Driver BMS. The incremental cost per QALY gained with the Endeavor DES over the Driver BMS was £3,757.

In the scenario analyses, using Endeavor II data only, the incremental cost-effectiveness ratio (ICER) was £5,716 and using the utilities from Oostenbrink, et al. (2001, see ‘Other Publications of Related Interest’ below for bibliographic details), the ICER was £2,970. Increasing the average number of DES stents increased the ICER to £12,005 and extending the clinical outcomes to five years produced an ICER of £1,607. Reducing the price of the DES made it dominant as it had better outcomes and lower costs and using DES prices that were published in a National Institute for Health and Clinical Excellence evaluation also made the DES dominant.

The results were most sensitive to the number of Endeavor or Driver stents used, the duration of clopidogrel therapy after stenting, the percentage of acute myocardial infarctions that were fatal, and the utility scores. Varying the model parameters simultaneously in the probabilistic sensitivity analysis showed that the Endeavor DES, compared with the Driver BMS, was cost-effective at a £20,000 threshold in 62% of simulations, and in 81% of simulations at a £30,000 threshold.

Authors' conclusions
The authors concluded that the Endeavor stents were likely to be cost-effective for patients who required coronary artery stenting, over a four-year time frame and using conservative assumptions.

CRD commentary
Interventions:
The stent characteristics were clearly described and the interventions appear to have been appropriate comparators. The drug-eluting stents might be feasible in other settings.

Effectiveness/benefits:
The efficacy of the stents and the occurrence of cardiac outcomes were from several clinical trials, which were all part of the Endeavor research programme. These trials appear to have been of high quality, but they should be consulted to assess the internal validity of the clinical estimates. It was unclear if a systematic review was undertaken, which makes it difficult to ascertain if all the best available evidence was used. The utility values were from previous studies, but the valuation methods were not reported and these studies should be consulted to assess the suitability of the estimates. The benefit measure was appropriately discounted.

Costs:
The perspective was that of the UK NHS and the analysis appears to have included all the relevant direct medical resources. The costs appear to have been appropriate as they were from national UK sources and one other study.

Analysis and results:
The Markov model was described and appears to have appropriately synthesised the evidence. The results were well reported and were combined in an incremental analysis. The sensitivity analysis was sufficient. The authors highlighted the differences between their analysis and those of Bagust, et al. 2006 and others. This study had a longer time horizon (four years as opposed to two years) and used a more precise cardiac outcome of target-vessel revascularisation. The authors acknowledged that it might be difficult to generalise their results into real-world practice.
Concluding remarks:
The methods were satisfactory and both they and the results were aptly reported. The authors’ conclusions appear to be appropriate.

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