Is minimally invasive harvesting of the great saphenous vein for coronary artery bypass surgery a cost-effective technique?


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 estimated the cost-effectiveness of minimally invasive harvesting of the saphenous vein compared with conventional open vein harvesting for patients receiving coronary artery bypass surgery. The authors concluded that minimally invasive vein harvesting was a cost-effective alternative to conventional vein harvesting techniques. In summary, most of the methods were reported explicitly, but there were some limitations to the analyses and, therefore, the authors’ conclusions should be interpreted with caution.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to estimate the cost-effectiveness of minimally invasive vein harvesting compared with conventional vein harvesting for coronary artery bypass surgery.

Interventions
Minimally invasive harvesting of the great saphenous vein through small incisions and endoscopy techniques was compared with the common open-harvesting technique which involves a longitudinal incision.

Location/setting
UK/inpatient care.

Methods
Analytical approach:
A decision analytic model was used to synthesise published data. The costs and effects were analysed over a six-week period from the date of surgery. The authors stated that the perspective was that of the UK National Health Service.

Effectiveness data:
The data on effectiveness included postoperative pain and mobility. The evidence for effectiveness was derived from a single clinical study (Kiaii, et al. 2002, see ‘Other Publications of Related Interest’ below for bibliographic details). The full details of the trial were not reported in this paper. Readers were referred to the original study (Kiaii, et al. 2002) for information on the sample size, follow-up period, and handling of the analyses. The original study was a prospective, randomised controlled trial and the visual analogue scale (VAS) was used to measure the postoperative pain and mobility scores at discharge and six weeks after surgery.

Monetary benefit and utility valuations:
The utilities were measured using the EuroQol-5D (EQ-5D) quality of life, five dimensional questionnaire. The pain and mobility scores from the VAS were converted to discrete scores between zero and three which were then mapped to an EQ-5D score. As only two of the five dimensions were measured, the remaining three dimensions were assumed to be similar across both surgical options.

Measure of benefit:
The measure of benefit used was quality-adjusted life-years (QALYs).
Cost data:
The cost types were hospitalisation, disposable endoscopic equipment, and theatre time. Locally-collected data were used for theatre time, NHS reference costs for hospitalisation, and manufacturer costs for endoscopic equipment. The costs were reported in US dollars ($) using an exchange rate of $1.98 equals £1.00. The price year was not reported.

Analysis of uncertainty:
A probabilistic sensitivity analysis was performed in order to assess the parameter uncertainty. Monte Carlo simulations were run with 10,000 reiterations. The results of the sensitivity analyses were illustrated using cost-effectiveness acceptability curves and a 95% confidence ellipse. Two additional scenario analyses were performed to test the estimates for QALYs over larger confidence intervals of -30% to +30% and -50% to +50%.

Results
The incremental cost of minimally invasive vein harvesting compared with conventional vein harvesting was $459 (standard deviation, SD: $304). The corresponding incremental effect was 0.0231 QALY (SD: 0.0057 QALY).

The incremental cost-utility ratio was $19,859 per QALY gained for minimally invasive vein harvesting.

At a threshold of $50,000 per QALY gained, the results of the probabilistic sensitivity analyses indicated that minimally invasive vein harvesting was cost-effective 96% of the time. When QALY estimates were tested at ±30%, minimally invasive vein harvesting was cost-effective 77% of the time and, at ±50%, it was cost-effective 68% of the time.

Authors’ conclusions
The authors concluded that minimally invasive vein harvesting was a cost-effective alternative to conventional vein harvesting techniques.

CRD commentary
Interventions:
: The two surgical options and their associated post-operative complications, including wound infections, were very briefly described. The profile of the intended patient population was not stated.

Effectiveness/benefits:
: The effectiveness data were derived from a single study, and the selection of this study was justified by the authors. However, the methods used to identify and select this study were not reported. It is, therefore, not possible to ascertain if the best available evidence was used in the model. Peri-operative mortality was not reported in this paper and it is unknown whether expected life-years were different between the two options. The derivation of utilities, by mapping VAS scores to the EQ-5D, was clearly reported and the authors acknowledged that this method was not validated.

Costs:
The types of costs appear to have been appropriate for the perspective. Peri-operative complications and possible downstream effects were excluded from the analyses. However, the authors predicted that these would be more favourable for those receiving minimally invasive vein harvesting. The sources of costs were clearly reported, but the price year was not stated making reflation exercises difficult.

Analysis and results:
: An illustration of the decision model structure with the data sources was presented. The cost and effect analyses were transparent and will enable the reader to capture all the assumptions and steps taken. It was unclear why triangular distributions were assigned to the distributions of cost and QALY estimates, which were not normal. Log normal distributions for costs, and beta distributions for QALYs may have been more appropriate and may have produced different results. Significant differences in health-related quality of life were not demonstrated in previous studies of the two options. However, the results of these additional studies were not incorporated into the sensitivity analyses, thus the incremental effects in this study may have been over reported. Although the authors tested the base-case 95% confidence intervals over wider ranges in the scenario analyses, the incremental difference in QALYs between the groups was held constant and therefore did not fully reflect alternative QALY results. The results of the sensitivity analyses were well-reported and illustrated. The study limitations were acknowledged and discussed by the authors.
Concluding remark:
: Despite some limitations, a reasonably transparent account of the methods was provided. Given the comments above, the authors’ conclusions should be considered with some caution.

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Other publications of related interest

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