Cost-effectiveness of coronary artery bypass surgery in octogenarians

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.

Health technology
Coronary artery bypass graft (CABG) surgery in octogenarians.

Type of intervention
Treatment.

Economic study type
Cost-utility analysis.

Study population
Elderly patients with coronary artery disease.

Setting
Secondary care. The economic study was carried out at the Columbia Presbyterian Medical Centre (CPMC), USA.

Dates to which data relate
Effectiveness and cost data were collected between 1992 and 1996.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
The authors retrospectively formed surgical and medically managed cohorts of octogenarians with significant multivessel CAD. More than 600 medical records of patients older than 80 years who underwent angiography in the authors’ institution were reviewed to identify 48 patients who were considered reasonable surgical candidates but had not undergone surgery. Patients were excluded if:

(1) their pathology was not primarily CAD;

(2) they had single-vessel or diffuse, nonsignificant multivessel disease;

(3) they were treated by transluminal angioplasty;

(4) they had severe comorbidities that would preclude CABG surgery; or
(5) cardiac surgical consults found them not to be suitable surgical candidates. There were no significant differences in age, sex, left ventricular ejection fraction percentage or incidence of diabetes between the two groups. The surgical group had a significantly higher reported incidence of hypertension, \(p=0.04\). The average duration of follow-up was 38 months for the surgical cohort and 31 months for the medically managed cohort. This cohort was compared with 176 patients who underwent surgery, identified through the hospital database maintained for the New York State Cardiac Surgery Reporting Systems.

**Study design**
This was a retrospective cohort study.

**Analysis of effectiveness**
The main health outcomes considered were survival rates and quality of life. Quality of life (QoL) was assessed using the EuroQol questionnaire. EuroQol assesses mobility, self-care, usual activity, pain, and anxiety/depression. A utility or index score of 1 indicates full health. The seventh item of the EuroQol questionnaire regarding patients’ overall impression of their present health was omitted because of difficulty in administering the question in telephone interviews.

**Effectiveness results**
The three-year survival rate was 80% for the surgical cohort and 64% for the medically managed cohort. For the subgroup of patients managed medically with a documented refusal of CABG surgery, a 50% ten-month survival rate was noted. In general, patients in the surgical cohort reported a better QoL across all five dimensions and perception of their general health in comparison with other people they knew. Patients in the surgical cohort were found to have an average utility or index score of 0.84, and patients in the medical cohort had an average score of 0.61, \(p<0.001\). Patients in the group of the medical cohort who refused CABG surgery had a utility of 0.74.

**Clinical conclusions**
CABG surgery should be offered to octogenarians with multivessel CAD who are considered reasonable surgical candidates.

**Measure of benefits used in the economic analysis**
Quality-adjusted life years (QALYs) gained were calculated.

**Direct costs**
The authors calculated the total average direct costs associated with either CABG surgery or medical management by applying proxies of resource costs or RCCs (ratio of costs to charges) to actual resource utilisation. Six major resource categories were considered: in-patient room charge or emergency room use, operation or catheterisation suite use, diagnostics, therapeutics, rehabilitation (cardiac and respiratory) and professional payments. DRG and Medicare reimbursement schedules were also used. A 3% annual discount rate was applied.

**Statistical analysis of costs**
Costs were not analysed statistically, although statistical analysis was used extensively for other comparisons between groups.

**Indirect Costs**
No indirect costs were included.
Currency
US dollars ($).

Estimated benefits used in the economic analysis
Quality-adjusted life years (QALYs) gained were calculated.

Cost results
The total average long-term costs per patient were as follows:

CABG, $45,422 ($41,438 index hospitalisation and $3,984 subsequent hospitalisation);

medical managed group, $16,140 ($12,467 index hospitalisation and $3,673 subsequent hospitalisation)

medical managed group who refused CABG, $17,042 ($15,232 index hospitalisation and $1,508 subsequent hospitalisation).

Synthesis of costs and benefits
The cost per QALY gained comparing all patients managed surgically with all patients managed medically was found to be $10,424. The cost per QALY gained in the group of patients treated surgically compared with the subgroup that refused CABG was found to be $9,423.

Authors' conclusions
Performing CABG surgery in octogenarians is highly cost-effective. The quality of life of the elderly who elect to undergo CABG surgery is greater than that of other cohorts and equal to that of an average 55-year-old person in the general population.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparators is clear, as both CABG and medical management of CAD were widely used in the authors' setting. You, as a database user, should consider if the same applies to your own setting.

Validity of estimate of measure of benefit
QALYs were used in the analysis, which were a highly appropriate measure for this condition. Quality of life was assessed using the EuroQol questionnaire, which is a reliable instrument for estimating utility scores. However, the authors acknowledge that because of the use of the cost-effectiveness metric (cost per quality adjusted year of life saved) chosen for the study, there is an inherent bias against the treatment of elderly patients. For every year of life saved for a patient aged eighty years or older, the survivor gains on average 10.9 more years of life whereas for a 20 year old, the survivor would be expected to live possibly another 50 more years. Therefore, if the treatment for both patients costs the same at $60,000, the cost per year of life saved is greater for the elderly patient than for the younger patient.

Validity of estimate of costs
The costing methodology was well-presented. A sound attempt was made to tackle methodological issues inherent in the measurement of costs including the conversion of charges to costs and the provision of information to allow the reader to track how unit costs were derived. No important cost items appear to have been omitted, but the costs are unlikely to be generalisable to other countries or settings due to the US cost structure present in the study.

Other issues
The authors acknowledged that the research design was suboptimal due to the potential for bias in patient selection in retrospective studies, but a strong effort was made to eliminate this bias as far as possible.

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None stated.

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