Cost analysis of early extubation after coronary bypass surgery

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
Early extubation after coronary bypass surgery, defined as removal of the endotracheal tube from the patient within 8 hours of arrival in the surgical ICU.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was patients undergoing coronary isolated bypass surgery with diagnostic related group 106 (coronary bypass surgery with coronary angiography at the same admission) and diagnostic related group 107 (coronary bypass surgery without coronary angiography at the same admission). Age and medical characteristics were similar in both groups. The mean age was 65 years in both groups. About two thirds of patients were male and almost one third of them were diabetic.

Setting
The setting was the Division of Cardiothoracic Surgery, Case Western Reserve University School of Medicine, University Hospitals of Cleveland, Cleveland, Ohio, USA.

Dates to which data relate
Effectiveness resource and cost data were collected during a 24-month period ending in September 1995.

Source of effectiveness data
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
690 consecutive patients undergoing isolated coronary bypass surgery were divided into 2 groups. Group 1 consisted of 328 patients who underwent coronary bypass surgery in the 12-month period before the initiation of an early extubation protocol (1994) and Group 2 consisted of 362 patients who underwent coronary bypass surgery during the 12-month period subsequent to implementation of early extubation (1995). No power calculation determined sample size.
Study design
The study was a case series. The duration of and loss to follow-up were not clearly stated.

Analysis of effectiveness
It seems that the analysis was based on treatment completers only. The main health outcomes used in the analysis were significant morbidity and operative mortality rates. Significant morbidity included: perioperative myocardial infarction, strokes, bleeding, sternal infection and kidney failure requiring dialysis. Operative death was defined as any death occurring within 30 days of operation or any death during the same hospital stay as the operation.

Effectiveness results
Operative mortality was 3.3% for the entire group and did not differ between the two groups. The incidence of serious morbidity was 10.9% for the entire group. Complication rates in the 1994 (control) and 1995 (early extubated) groups were as follows:

- perioperative myocardial infarction (1.83% vs. 3.59%),
- strokes (permanent: 0.00% vs. 1.38%; transient: 1.22% vs. 0.83%),
- bleeding (4.27% vs. 3.31%),
- sternal infection (1.52% vs. 0.83%)
- and kidney failure requiring dialysis (1.83% vs. 1.10%).

Confidence intervals and p values were reported with these results.

Clinical conclusions
Early extubation after coronary artery bypass is safe.

Measure of benefits used in the economic analysis
As the effectiveness analysis showed no difference in clinical benefit between the strategies investigated, the economic analysis was based on the difference in costs only.

Direct costs
Costs and quantities were not reported separately. Direct health service costs were considered. Only costs related to patient health care (variable direct costs - the only component of cost that can be varied by the clinician's clinical decision making) were analysed. Cost data were obtained using an integrated hospital cost management and decision system software package (Transition Systems Inc., Boston, MA) which integrates a range of clinical, financial and operational information from the hospital's existing data management systems and divides costs into various categories. It is unclear whether final costs were given in 1994 or 1995 values.

Statistical analysis of costs
All data were prospectively collected on standardised forms and entered into a computerised database (Summit Medical Inc., Minneapolis, MN). Differences between the two groups were tested for statistical significance by means of t test and chi-square test as appropriate.

Currency
US dollars ($).
Sensitivity analysis
Not performed.

Estimated benefits used in the economic analysis
Not applicable.

Cost results
The variable direct cost per case decreased from $9,962 to $8,279 (p=0.001) between 1994 and 1995. Significant cost reductions were noted in the telemetry ward, the lab and the operating room costs. Postoperative length of stay declined from 9.4 days to 7.7 days (p<0.01).

Synthesis of costs and benefits
Not applicable.

Authors' conclusions
Early extubation after coronary bypass surgery was an effective strategy for reducing length of stay and did not appear to impact on either morbidity or mortality. An additional benefit was significant cost savings realised through accelerated recovery and control of resource use.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator is clear, as this is a widely used health technology in the authors' setting.

Validity of estimate of measure of benefit
Data do not appear to have been used selectively to prove a particular point and the choice of health outcomes is justified.

Validity of estimate of costs
Adequate details of methods of quantity/cost estimation were given and no important cost items were omitted.

Other issues
Cost data may not be generalisable to other settings/countries.

Source of funding
None stated.

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