Early tracheal extubation after coronary artery bypass graft surgery reduces costs and improves resource use: a prospective, randomized, controlled trial

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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.

Health technology
Early tracheal extubation (1-6 hours) after coronary artery bypass graft surgery (CABG).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing CABG, younger than 75 years and with left ventricular function classified as grade I-IV and stable or unstable angina.

Setting
Division of Cardiac Anaesthesia & Intensive Care in the Toronto Hospital, University of Toronto, Canada.

Dates to which data relate
Effectiveness and cost data were collected between May 1992 and May 1994.

Source of effectiveness data
Single study.

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

Study sample
100 patients undergoing CABG were studied. They were randomly allocated to either the early extubation group (n=50) or late extubation group (n=50), according to a computer generated randomisation code. The participant's randomisation assignment was concealed in an envelope until anaesthesia was induced. There were no significant demographic differences between the two groups.

Study design
Prospective, randomised, controlled clinical trial.
Analysis of effectiveness
The analysis of effectiveness was based on treatment completers only. The main health outcomes used in the analysis were the number of complications and the mortality rates. The complications considered were: postoperative myocardial infarction (PMI), sepsis, re-exploration for bleeding, arterial arrhythmia, re-intubation for pneumonia, renal insufficiency and leg wound infection, and cardiovascular accident and death.

Effectiveness results
Early tracheal extubation did not increase the risk of major complications when compared with late tracheal extubation.

Clinical conclusions
Early tracheal extubation did not increase the risk of major complications when compared with late tracheal extubation. 2 deaths were recorded in the late extubation group.

Modelling
Not performed.

Measure of benefits used in the economic analysis
Since the effectiveness analysis showed no difference in effectiveness between the intervention and the comparator, the economic analysis was based on the difference in costs only.

Direct costs
All costs applicable to each of the services were summations of direct variables, direct fixed costs, and overhead (indirect variables and indirect fixed) costs. The service unit workload cost was determined by accretion of direct variable and fixed costs used to provide a particular service. The total service cost was the summation of unit workload cost and overhead cost. This cost accounting per patient was adopted for the preoperative, intraoperative, CVICU, pharmacy, physiotherapy, laboratory medicine, radiology (including heart catheterization), respiratory therapy, clinical nutrition and social services.

Statistical analysis of costs
Differences between the early and late group cost analysis and demographic data were calculated using a two-tailed unpaired Student's t test. The comparison of resource use between early and late extubation groups was done using Fisher exact test. Differences were considered significant if p<0.05.

Currency
Canadian dollars (Can$)

Estimated benefits used in the economic analysis
Not applicable.

Cost results
The total costs per CABG surgery in early and late extubation were Can$17,640 (+/- 1,677) and Can$19,399 (+/- 2,886) respectively, thus saving Can$1,699, p=0.001. Including all complications, early extubation (n=50) significantly reduced cardiovascular intensive care unit (CVICU) costs by 53% (p<0.026) and the total CABG surgery cost by 25% (p<0.019) when compared with late extubation (n=50). In the early extubation group, the actual departmental cost savings in CVICU nursing and supplies was 23% (p<0.005), in ward nursing and supplies 11% (p<0.05), and in respiratory therapy 12% (p<0.05). The total cost savings per patient undergoing CABG were 9%. Further cost savings
included: 51% for CVICU nursing and supplies, 9% for ward nursing and supplies and 29% for respiratory therapy, for a total cost saving per patient of 13%.

**Synthesis of costs and benefits**
Not applicable.

**Authors' conclusions**
Early tracheal extubation anaesthetic management reduces total costs per CABG surgery by 25%, predominantly in nursing and in CVICU costs. Early extubation reduces CVICU and hospital length of stay but does not increase the rate or costs of complications when compared with patients in the late extubation group (it shifts the high CVICU cost to the lower ward costs). Early extubation also improves resource use after cardiac surgery when compared with late extubation.

**CRD COMMENTARY - Selection of comparators**
The selection of comparators is justified as early and late extubation are widely used in the authors' setting. You, as a user of this database, should consider if this applies to your own 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**
Extensive details of the 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 or countries.

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