Randomized assessment of resource use in fast-track cardiac surgery 1-year after hospital discharge


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
The use of fast-track cardiac anaesthesia (FTCA) was examined. FTCA was induced using fentanyl (15 microg/kg) and pancuronium (0.15 mg/kg) and maintained with end-tidal isoflurane (0.5 - 2.0%). The patients were assessed for tracheal extubation within 1 to 6 hours of their arrival in the post-cardiac surgery unit (PCSU).

Type of intervention
Anaesthesia.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients aged younger than 75 years who were undergoing primary elective coronary artery bypass graft (CABG) surgery.

Setting
The setting was a hospital. The economic study was carried out in Canada.

Dates to which data relate
The effectiveness and resource use data were gathered from 1993 to 1995. The price year was not reported.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was performed prospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Power calculations do not appear to have been performed. All eligible patients undergoing CABG during the study period were enrolled in the study. The final sample included 120 patients, 60 in each group. It was not stated whether some patients were excluded from the initial study sample for any reasons or whether any patients refused to participate.

Study design
This was a randomised controlled trial. There were no details of the centres where the study was carried out. The patients were randomised to the study groups using a computer-generated code. The patients were followed for one year postoperatively. No patient appears to have been lost to follow-up. The follow-up data were gathered from several sources, which were reported in detail.

**Analysis of effectiveness**

The basis for the analysis of the clinical study (intention to treat or treatment completers only) was not stated. The primary health outcomes used in the analysis were postoperative extubation time, perioperative hospital length of stay (LOS), perioperative mortality, long-term mortality, readmissions to acute care hospitals, and admissions to rehabilitation facilities. The two groups were comparable at baseline in terms of their age, weight and clinical parameters.

**Effectiveness results**

The postoperative extubation time was 4.1 (+/- 1.1) hours in the FTCA group and 18.9 (+/- 1.4) hours in the CON group, (p<0.02).

The perioperative hospital LOS was 7.55 (+/- 2.87) days in the FTCA group and 9.95 (+/- 7.10) days in the CON group.

Perioperative mortality was 1 patient in the FTCA group and 3 patients in the CON group.

The long-term mortality was 0 in both groups.

After 3 months, the readmission rates to acute care hospitals were 8.3% in the FTCA group and 13.3% in the CON group. However, the average LOS was 0.3 (+/- 1) days (FTCA) and 1.6 (+/- 6.3) days (CON), respectively, (p=0.01).

After 1 year, the readmission rates to acute care hospitals were 25% in both groups, but the average LOS was 0.8 (+/- 1.8) days in the FTCA group and 2.9 (+/- 9.6) days in the CON group, (p=0.01).

The admission rates to rehabilitation facilities were 3.3% in the FTCA group and 15% in the CON group. However, the LOS was 0.3 (+/- 1.5) days (FTCA) and 2.3 (+/- 5.7) days (CON), respectively, (p=0.001).

**Clinical conclusions**

The effectiveness study showed that FTCA was a safe procedure that significantly reduced the LOS, both perioperatively and in the long term.

**Measure of benefits used in the economic analysis**

The health outcomes were left disaggregated and no summary benefit measure was used. The study has therefore been classified as a cost-consequences analysis.

**Direct costs**

Discounting was not relevant since the costs per patient were incurred during one year. The unit costs were not analysed separately from the quantities of resources used. The health services included in the economic evaluation were all inpatient and outpatient expenses related to the surgical procedure. The cost/resource boundary adopted in the study was that of the Canadian health system. Resource use was estimated alongside the clinical trial, which provided the effectiveness evidence from 1993 to 1995. The unit costs came from the Ontario Health Insurance Plan (OHIP) and the Ontario Drug Benefit claims (for patients older than 65 years only). The price year was not reported.

**Statistical analysis of costs**

Five thousand bootstrap resamples were performed to evaluate the statistical significance of differences in the
estimated costs. The data were reported as average values plus or minus (+/-) the standard deviation, along with 95% confidence intervals (CIs).

**Indirect Costs**
The indirect costs were not included.

**Currency**
Canadian dollars (Can$).

**Sensitivity analysis**
Sensitivity analyses were not conducted.

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.

**Cost results**
After 1 year, the total estimated inpatient costs were Can$2,005.5 (+/- 1,746.5) in the FTCA group and Can$3,971.5 (+/- 7,095.9) in the conventional group (bootstrap 95% CI of means: 608.8 - 3,462; p=0.0004).

A similar trend was observed in the short term (the first 3 months after the main surgery).

The overall cost reduction in the FTCA group, compared with the CON group, was 49.5% in the 1-year follow-up.

**Synthesis of costs and benefits**
The costs and benefits were not combined. The analysis was classified as a cost-consequences study.

**Authors' conclusions**
From the perspective of the third-party payer, fast-track cardiac anaesthesia (FTCA) during coronary artery bypass graft (CABG) surgery was a safe anaesthetic procedure that reduced resource use in comparison with the conventional (CON) approach.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparator was clear. It represented the standard anaesthetic approach for patients undergoing CABG surgery. You should decide whether it is a valid comparator in your own setting.

**Validity of estimate of measure of effectiveness**
The effectiveness analysis used a randomised trial, which was appropriate for the study question and should enhance the internal validity of the study. The method of randomisation was described, but details of the enrolment procedure were not reported. In addition, it was unclear whether some patients refused to participate in the study or whether any were excluded from the initial study sample. The analysis of the clinical study appears to have been conducted on an intention to treat, as no patient was lost to the follow-up evaluation, although this was not explicitly stated in the paper. The study sample appears to have been representative of the study population and no specific inclusion or exclusion criteria were used. However, power calculations were not reported and there was no evidence that the sample size was appropriate. Thus, it is not possible to rule out the possibility that the results obtained were due to chance.
Validity of estimate of measure of benefit
No summary benefit measure was used in the economic analysis. The analysis was therefore categorised as a cost-consequences study.

Validity of estimate of costs
The perspective adopted in the study was reported, but a detailed breakdown of the costs was not provided. The unit costs and the quantities of resources used were not analysed separately, and the price year was not given. This makes it difficult to reproduce the study in other settings. Statistical analyses were conducted on both the quantities and unit costs. However, the cost estimates were specific to the study setting and sensitivity analyses were not conducted. These factors limit the generalisability of the findings. The authors acknowledged that the drug costs were limited to those observed in patients older than 65 years of age.

Other issues
The authors made several comparisons with earlier studies, including one conducted by themselves at their own institution. However, the issue of the generalisability of the study results to other settings was not addressed and sensitivity analyses were not performed. Thus, the external validity of the analysis is low. The authors stressed that their conclusion should be limited to patients aged younger than 75 years. They also noted some strengths and limitations of their study.

Implications of the study
The study results suggested that FTCA may be used safely for the anaesthesia of patients undergoing primary CABG surgery. The authors stressed that further research should identify the patients who are at major risk for long-term morbidity and readmission to health care facilities.

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