An economic evaluation of propofol/fentanyl compared with midazolam/fentanyl on recovery in the ICU following cardiac surgery

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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
Propofol/fentanyl compared with midazolam/fentanyl as anaesthetic strategy in cardiac surgery.

Type of intervention
Supportive care; Rehabilitation.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing elective cardiac surgery with a routine postoperative recovery.

Setting
Northern General Hospital, Sheffield, UK.

Dates to which data relate
Data were collected between June 1991 and September 1992. 1993 prices were used for drugs and 1993/94 salary scales were used.

Source of effectiveness data
Effectiveness data were taken 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
Of the 77 patients (40 propofol - group 1, 37 midazolam - group 2) who entered the study, 70 had complete information up to the time of discharge from the ICU (37 propofol and 33 midazolam). Seven patients were withdrawn (7.5% in group 1,and 11% in group 2) because they were considered not to follow a routine peri-operative course. Power calculations were not reported.

Study design
The study was a single-centre randomised controlled trial. The duration of follow-up was until ICU discharge.
Analysis of effectiveness
The analysis was based on treatment completers only. (NB: since this abstract was written the authors have pointed out that "these patients did not follow a routine perioperative course due to reasons which were not related to the sedative agent and that extubation and discharge information was not available - since the percentage was slightly higher in the midazolam group, this could be considered a conservative approach"). The main health outcomes used in the analysis were times from entry to the ICU until extubation and discharge. The groups were comparable in terms of age, weight, type of operation (Coronary Artery Bypass Graft (CABG), valve replacement (VR), or Coronary Artery Bypass Graft plus Valve Replacement (CABG/VR)) and ventricular function, cardiac function and blood gases at entry in the ICU, but not in terms of sex (30% female in the propofol group versus 12% in the midazolam group).

Effectiveness results
The median time from entry to ICU to extubation was 4.33 hours for the propofol group versus 9.17 hours for the midazolam group and the median time to discharge was 22.44 hours for the propofol group versus 23.57 hours for the midazolam group.

Measure of benefits used in the economic analysis
The measure of benefits used in the economic analysis was the time saved in the ICU for extubation and discharge.

Direct costs
While quantities of resource use were analysed separately from costs, the total costs for each patient were calculated as the sum of nursing and drug costs. 1993 prices were used for drug-related costs (British National Formulary, September 1993) and 1993/94 salary scales (adjusted for superannuation) for nursing time-related costs. All the other costs were assumed to be common to both strategies (differences in the costs of running the ventilator were assumed to be small).

Statistical analysis of costs
Two-sided t-tests were used to compare total costs between groups. Comparisons were performed both in terms of the original data and log-transformed estimates.

Currency
UK pounds Sterling (€).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
The median time from entry to ICU to extubation was 4.33 hours for the propofol group versus 9.17 hours for the midazolam group and the median time to discharge was 22.44 hours for the propofol group versus 23.57 hours for the midazolam group.

Cost results
The total cost for patients in the propofol group was 13.3% less than for the midazolam patients (95% CI: 0.4 - 27.8%; p=0.043). The total cost per patient was 315.52 and 358.75 for the propofol and midazolam patient groups respectively (p=0.068).

Synthesis of costs and benefits
Since the 'propofol strategy' turned out to be the dominant one, costs and benefits were not combined.

**Authors' conclusions**
Although the clinical study was not designed for economic endpoints it demonstrated achievable savings in propofol-treated patients.

**CRD COMMENTARY - Selection of comparators**
The reason for the choice of the comparator is clear, as this was a widely used technique 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**
The effectiveness study was based on the principle of analysis of treatment completers only and, therefore, the hypothesis tested actually differed from that which served as the basis for the study design. The choice of health outcomes was justified by the authors in the light of reported benefits such as avoiding continuing sedation, and the benefits accruing to other patients awaiting for an ICU bed.

**Validity of estimate of costs**
Adequate details of the methods of quantity/cost estimation were given. Note that all other costs apart from nursing and drug-related costs, were omitted from the analysis because they were assumed to be common. (in terms of costs incurred outside the ICU, the authors recognised that the reduction in ICU stay associated with the 'propofol strategy' does not necessarily imply a reduction in hospital stay).

**Other issues**
Cost data may not be generalisable to other settings/countries. Appropriate comparisons with other relevant studies were made.

**Implications of the study**
Further studies are needed which address the specific question of cost-effectiveness of the anaesthetic strategies in elective surgery.

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