The cost-effectiveness of methohexital versus propofol for sedation during monitored anesthesia care

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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
The use of two drugs, propofol (50 microg kg^-1 min^-1) and methohexital (40 microg kg^-1 min^-1), during monitored anaesthesia care of women undergoing breast biopsy procedures.

Type of intervention
Anaesthesia.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised women undergoing breast biopsy procedures. The exclusion criteria included age less than 18 years, a positive pregnancy test, morbid obesity (more than 50% above ideal body weight), and clinically significant cardiovascular, pulmonary, renal or hepatic disease. Women were also excluded if they had a history of allergic reaction to any of the study medications, a history of neurological impairment or inability to understand the psychological assessment tools, or a history of porphyria.

Setting
The setting of the study was a day surgery unit (DSU). The economic study was carried out at the University of Texas Southwestern Medical Center in Dallas (TX), USA.

Dates to which data relate
No dates for the effectiveness and resource use data were reported. The price year was not mentioned.

Source of effectiveness data
The effectiveness evidence came 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
Preliminarily power calculations were conducted. These showed that a sample of 30 patients per group was required to detect a 30% reduction in the time for the patients to meet the criteria for discharge (home-readiness) with a power of 0.9 (alpha=0.05). The method of sample selection was not reported. The overall sample included 60 patients, 30 women in each group. The mean age was 45 (+/- 15) years in the propofol group and 47 (+/- 15) years in the...
methohexital group. It was not stated whether any female refused to participate or was excluded from the initial study sample.

**Study design**
This was a randomised controlled trial, which was carried out in a single centre. The method of randomisation was not reported. The patients were not followed-up after the end of the biopsy procedures. The study was based on a single blinded protocol since a blinded observer assessed the outcomes.

**Analysis of effectiveness**
All patients included in the initial sample were taken into account when estimating the effectiveness (intention to treat basis). The primary health outcomes used in the analysis were:

- the time to the observer’s assessment of alertness/sedation (OAA/S), ranging from 1 (wide-awake and alert) to 5 (asleep and/or unarousable), score of 3, or return to OAA/S score of 1;
- pain during injection;
- preoperative side effects;
- the requirement for antiemetic medication;
- the time to ambulation;
- the time to home-readiness;
- the time to actual discharge;
- episodes of nausea and vomiting;
- heart rate and systolic and diastolic blood pressure;
- the respiratory rate and end-expiratory CO2;
- the level of sedation (OAA/S);
- the change in the anxiety status, measured using a 100-mm visual analogue scale; and
- changes in psychomotor function, expressed as a percentage of the preoperative (baseline) score on the digital-symbol substitution test.

The study groups were comparable at baseline with respect to their age, ASA physical status and surgery details.

**Effectiveness results**
Twenty-three per cent of the patients in the propofol group reported pain during injection compared with 10% in the methohexital group. The systolic and diastolic blood pressures were significantly lower in the propofol group 10 and 20 minutes after starting the infusion.

All of the remaining outcomes were similar between the two groups and the observed differences did not reach statistical significance.

**Clinical conclusions**
The effectiveness analysis showed that the two anaesthetics were quite similar in the main outcomes, reflecting equal
safety profiles and anaesthetic efficacy. However, greater pain was observed in the propofol group.

**Measure of benefits used in the economic analysis**
The health outcomes were left disaggregated and no summary benefit measure was used in the economic study. A cost-consequences analysis was therefore carried out.

**Direct costs**
Discounting was not relevant because the costs were incurred in a short time period. The unit costs were analysed separately from the quantities of resources used. The health services included in the economic evaluation were the anaesthetic drugs (propofol and methohexital). The analysis focused on the actual amount of drug infused and on the drug wastage. The cost/resource boundary adopted in the study was not stated explicitly. Resource use was estimated with actual data from the individual use of each patient included in the effectiveness study. The cost data were obtained from the University of Texas Southwestern Medical Center in Dallas. The cost per vial was reported for both study drugs. The price year was not provided.

**Statistical analysis of costs**
Standard statistical analyses of the costs were carried out to test the statistical significance of the difference in the total costs of the two drugs.

**Indirect Costs**
The indirect costs were not included in the economic evaluation.

**Currency**
US dollars ($).

**Sensitivity analysis**
Sensitivity analyses were not carried out.

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

**Cost results**
The estimated cost per patient, based on the amount of drug infused, was $12.8 (+/- 9.3) with propofol and $5.1 (+/- 7.8) with methohexital, (p<0.05). However, when drug wastage was also taken into consideration, the estimated cost per patient increased to $18.2 (+/- 9.2) with propofol and $16 with methohexital. This difference did not reach statistical significance.

**Synthesis of costs and benefits**
Not relevant because a cost-consequences analysis was carried out.

**Authors’ conclusions**
The two anaesthetics showed similar effectiveness and similar costs when the drug wastage was taken into consideration. However, the level of pain was greater in the propofol group.
CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparators was clear. The authors stated that methohexital represented a widely
used anaesthetic, which was replaced by propofol due to its more favourable recovery profile. You should decide
whether they represent valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness analysis used a randomised controlled trial, which ensures a high internal validity. Power
calculations were also performed and the sample was adequate for the study question. The analysis of the effectiveness
was conducted on an intention to treat basis. Further, the study groups were comparable at baseline and a single
blinded protocol was used. However, the methods of randomisation and sample selection were not reported. The
authors stated that double-blinding was not feasible due to the apparent differences in the two anaesthetic solutions.

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 not stated and only the drug costs were included in the analysis. The unit
costs and resource use were analysed separately, thus enhancing the reproducibility of the study. However, the price
year was not reported, thus limiting the possibility of carrying out reflation exercises in other settings. Statistical
analyses were carried out only to compare the estimated costs. The source of data was reported. The cost estimates
were specific to the study setting and sensitivity analyses were not carried out.

Other issues
The authors made several comparisons of their findings with those from published studies and found similar results,
mainly in terms of the effectiveness evaluation. However, the issue of the generalisability of the study results to other
settings was not addressed and sensitivity analyses were not performed. Consequently, the external validity of the
analysis is modest. The analysis focused on patients treated in a setting of monitored anaesthesia care and this was
reflected in the conclusions of the study.

Implications of the study
The main implication of the study is that methohexital is an acceptable alternative to propofol. Cost-savings may be
associated with methohexital, although this would depend on the amount of drug wastage. In institutions in which the
methohexital can be diluted in the pharmacy and divided into smaller dosage units, wastage will reduce and
methohexital will turn out to be a cost-saving option.

Source of funding
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