A first-pass cost analysis of propofol versus barbiturates for children undergoing magnetic resonance imaging

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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
Administration of intravenous propofol versus barbiturates (thiopental/pentobarbital) for children undergoing magnetic resonance imaging (MRI).

Type of intervention
Diagnosis

Economic study type
Cost-effectiveness analysis.

Study population
Children aged 11 months to 6.5 years undergoing MRI of the brain or spine.

Setting
Hospital. The economic study was carried out in New Haven, USA.

Dates to which data relate
Costs related to 1993-4. It was not stated when effectiveness and resource data were collected.

Source of effectiveness data
Derived from a single study

Link between effectiveness and cost data
Costing was done retrospectively on the same patient population used to assess effectiveness.

Study sample
58 children were randomised to Group I (propofol) and Group II (barbiturates). There was no indication of power calculation.

Study design
This was a randomised controlled trial, single centre study. The assessors of MRI scans (radiologist) and of recovery scores were blinded to whether propofol or barbiturates were used. Parents were asked about side-effects 24 hours after the MRI session. There was no loss to follow-up.
Analysis of effectiveness
Analysis was based on intention to treat. Main outcomes were patient morbidity (desaturation and vomiting) and technical quality of the MRI scans. MRI scans were reviewed for quality on a scale from 1 to 10, i.e. from "unreadable, must be repeated" to "perfect technical quality". The two groups were comparable in terms of demographic characteristics or types of MRI.

Effectiveness results
The incidence of oxygen desaturation was: barbiturates 4% versus propofol 5%, not significant. All desaturation resolved spontaneously (71% propofol versus 74% barbiturates). The incidence of vomiting was 8% versus 7%, not significant. The average MRI "quality score" was 9.0 +/- 1.3 for the propofol group, and 8.3 +/- 1.9 for the barbiturates group. The difference was not statistically significant.

Clinical conclusions
Intervention and comparator were equally effective in anaesthetising patients for good quality MRI scans.

Measure of benefits used in the economic analysis
Since the effectiveness analysis did not show difference in outcomes, no measure of benefits was used in the economic analysis.

Direct costs
Costs and quantities were reported separately. Only hospital costs were considered, such as nursing staff time, length of postanaesthesia care unit (PACU) stay, and drugs. Some of these resources were measured using time of recovery and time to discharge data for the intervention and comparator groups. The final cost analysis was performed incorporating these data into a theoretical management model of a pediatric MRI Centre. 1993-94 costs were used for drugs and wages.

Statistical analysis of costs
Mean values, standard deviations and p-values were reported for time of recovery data. Standard errors and p-values were reported for other recovery indicators.

Indirect Costs
Only quantities were reported. Parents' production losses were measured. (However, this cost was not included since no difference between the groups was assumed).

Currency
US dollars ($).

Sensitivity analysis
A sensitivity analysis was not carried out

Estimated benefits used in the economic analysis
Not applicable.

Cost results
The drug cost difference was calculated from the management model, assuming 629 patients a year, and different types
of scan. The total costs were: Propofol, $2590.43; Barbiturates, $860.67. This gave a cost difference for 629 patients a year of $1729.76, adjusted to $1600.76 if waste of drug was considered. The use of propofol reduced nursing time in the PACU, causing a saving of $5086.67 a year, when the pediatric MRI model was used. Therefore, overall a yearly saving of $3227.91 was obtained with propofol. Some cost components regarding radiologic and anaesthesia costs were excluded from the analysis since they were presumed to be the same for both groups.

Synthesis of costs and benefits
Not applicable

Authors' conclusions
Propofol sedation was associated with a significantly shorter recovery time than thiopental/pentobarbital sedation in paediatric MRI scans. A cost analysis suggested that propofol may be more suitable for children undergoing an outpatient procedure despite its higher price.

CRD Commentary
a) As the authors themselves recognise, a limitation of this preliminary study is that many of the anaesthesia and radiologic costs were not quantified but were assumed to be the same for both groups. b) The authors addressed opportunity costs since they reported that hospital organisation would have to be flexible enough to take advantage of the time savings for nursing staff, moving these resources between pediatric PACUs. c) Consideration might have been given to the implications of the results for hospitals which do not have "the most" experience of MRI. d) The sample size may have been too small for extrapolation of the results.

Implications of the study
An economic evaluation with an exhaustive and comprehensive cost analysis is required.

Bibliographic details

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Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Anesthesia Recovery Period; Anesthesiology /economics; Child; Child, Preschool; Consciousness /drug effects; Drug Therapy /economics; Humans; Infant; Infusions, Intravenous; Magnetic Resonance Imaging /adverse effects /economics /methods; Pentobarbital /adverse effects /therapeutic use; Propofol /adverse effects /therapeutic use; Thiopental /adverse effects /therapeutic use

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