Which anaesthetic agents are cost-effective in day surgery: literature review, national survey of practice and randomised controlled trial


Authors' objectives
To provide a comprehensive and critical analysis of the currently available evidence regarding anaesthesia in adult and paediatric day surgery.

Searching
MEDLINE, DARE, BIDS-ISI, CINAHL, the Cochrane Library, EMBASE, PsycINFO, EconLit, HEED and NHS EED were searched to December 2000; the search strategies were reported. The authors did not stipulate any language restrictions, although one of the search strategies appears to have been restricted to the English language.

Study selection
Study designs of evaluations included in the review
Comparative studies were eligible for inclusion. The majority of the included studies were randomised controlled trials (RCTs); however, non-randomised controlled clinical trials (CCTs), comparative studies and descriptive studies were also included in the review. Systematic reviews and meta-analyses were also included, although these are not examined further in this abstract.

Specific interventions included in the review
Studies examining one of the following anaesthetic agents were included: nitrous oxide, propofol, thiopentone, halothane, enflurane, isoflurane, or sevoflurane. The included studies examined numerous anaesthetic drugs alone or in combination, administering them by fixed dose or according to body weight.

Participants included in the review
Studies examining adult and paediatric patients admitted for day surgery were included. The patients in the included studies had been admitted for a wide range of surgical procedures addressing, for example, gynaecological, urological and orthopaedic complaints. The majority of the included studies were based in the USA, Canada or the UK.

Outcomes assessed in the review
The outcomes measured in the primary studies were not used to select studies for inclusion in the review. The authors of the review reported both clinical and patient-based outcomes. The former spanned five areas of recovery assessment: early recovery, intermediate recovery, late recovery, psychomotor recovery and unwanted side-effects. The latter referred to 'the array of questionnaires, interview schedules and other related methods of assessing health, illness and benefits of healthcare interventions from the patient's perspective'.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
RCTs and observational studies were assessed using checklists published in CRD Report 4. (See Other Publications of Related Interest no.1). Studies reporting patient-based outcomes were also assessed with regard to the quality of the instruments employed using a published checklist (see Other Publications of Related Interest no.2). This checklist examined appropriateness, reliability, validity, responsiveness, precision, interpretability, acceptability and feasibility. The authors did not state how the papers were assessed for validity, or how many reviewers performed the validity assessment.
Data extraction
The authors stated that a standard method of data extraction was employed. Further details are available by request from the authors. Data were extracted and presented on: design, publication type, interventions, participants, results, authors' conclusions and validity comments. Clinical and patient-based outcomes were extracted as reported in the included studies.

Methods of synthesis
How were the studies combined?
A narrative synthesis of the studies was undertaken.

How were differences between studies investigated?
The authors highlighted key differences between the included studies in terms of study design, setting, outcomes and the specific interventions under study. In addition, the studies were grouped within the narrative according to the type of outcome and the age of the participants.

Results of the review
The authors reported that 128 RCTs, 8 CCTs, 34 descriptive studies and 1 comparative study were included in the review. However, these figures differ from those presented in the tables of the review. The total number of included participants was not reported.

Following extensive reporting of the results of the adult (n=89) and paediatric (n=30) clinical outcome studies, the authors highlighted the following.

The evidence available was primarily from small RCTs concentrating on discharge times and postoperative nausea and vomiting (PONV) before discharge, with insufficient emphasis on clinical parameters after discharge.

It was unclear from the evidence which was the optimal agent for induction or maintenance.

It was unclear whether the use of propofol for induction reduces PONV over inhalational agents, although propofol is superior to thiopentone in this respect.

There appeared to be no difference in clinical parameters between sevoflurane and halothane for induction in children, apart from emergence agitation.

There appeared to be no clear optimal inhalational agent for maintenance of anaesthesia.

The induction agent appeared to have more impact on recovery than the maintenance agent.

The use of propofol in total intravenous anaesthesia reduced PONV rates compared with other anaesthetic combinations.

It was unclear whether nitrous oxide had any impact on clinical parameters.

Different patient groups and different types of surgery led to different base rates in PONV, and the range of anaesthetic techniques had different effects on clinical outcomes.

On the basis of the adult (n=39) and paediatric (n=13) patient-based outcome studies included in the review, the authors noted the following.

No reliable evidence exists which identifies whether differences in patients' satisfaction, preferences or self-assessed quality of life are caused by different anaesthetic techniques.

From the evidence available, it was not possible to state which were the optimal induction or maintenance anaesthesia techniques for day-surgery patients.
The majority of tools used in the adult studies were unvalidated and were rarely used beyond hospital discharge.

No comparative studies of paediatric day-surgery anaesthesia exist in the UK.

**Cost information**
The authors suggested that propofol and sevoflurane may cost more than thiopentone, desflurane and isoflurane. A full economic evaluation was reported in the review.

**Authors’ conclusions**
The authors concluded that no optimal regimen had been identified for adults or children on the basis of clinical outcome, patient acceptability or efficiency.

**CRD commentary**
The research question addressed by the authors was clearly reported. The inclusion criterion relating to study design was vague, introducing the possibility of selection bias. The searches of electronic databases were thorough. However, no attempt to identify unpublished literature was reported, and the authors did not explicitly report any language restrictions. The review may thus be subject to publication and/or language bias. The results of the quality assessment of the included studies were tabulated, but the summaries were uninformative and inconsistent. Details of the included studies were clearly presented in tabular format, although the numbers did not appear to correlate with information presented in the text.

A narrative synthesis of the results appears appropriate given the wide range of anaesthetic agents and combinations examined. Possible sources of heterogeneity were also highlighted in the text. No steps taken to minimise bias in the review process were reported. Nevertheless, the general conclusions presented in the review appear fairly reliable.

**Implications of the review for practice and research**
The authors did not state any implications for practice or further research specifically identified from this systematic review. However, the authors did highlight implications identified from the national survey of practice and RCT conducted alongside this review.

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