Meta-analysis of trials comparing postoperative recovery after anesthesia with sevoflurane or desflurane

Macario A, Dexter F, Labarsky D

CRD summary
This review compared differences in recovery between patients receiving sevoflurane and desflurane. The authors concluded that desflurane reduced the time to recovery by 1.0 to 1.2 minutes, but there were no significant differences between the anaesthetics for time to discharge and post-operative nausea and vomiting. It is difficult to assess the robustness of the conclusions given the limited search and that differences between the studies were not assessed.

Authors' objectives
To compare the differences in post-operative recovery between sevoflurane and desflurane.

Searching
MEDLINE was searched to December 2003; the search terms were reported. The reference lists of identified studies were also checked. Studies reported only as abstracts were excluded.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion.

Specific interventions included in the review
Studies that compared sevoflurane with desflurane were eligible for inclusion. Studies assessing neuromuscular blockade were excluded. In the included studies, the average duration of surgery was 1.2 hours (range: 18 minutes to 2.9 hours) and the mean duration of anaesthesia was 1.6 hours (range: 19 minutes to 3.1 hours).

Participants included in the review
Studies of patients undergoing general anaesthesia were included. Studies of volunteers undergoing anaesthesia but not surgery were excluded. The included studies were conducted in children (mean age 3 to 4 years) and adults (mean ages 29 to 74 years).

Outcomes assessed in the review
The review assessed the time taken for patients to obey commands, be extubated, be orientated, be discharged from the phase I and phase II post-anesthetic care unit (PACU) (nurse-to-patient ratio of 1:2 or less for phase I and 1:3 or more for phase II), be discharged home, and post-operative nausea and vomiting (PONV; early nausea, early vomiting, early treatment, late nausea and late vomiting). Studies reporting PONV outcomes had to present sufficient data on early (in PACU or within 4 hours of arrival) and late (between 4 and 24 hours after PACU arrival) nausea, and early and late rescue treatment to allow the construction of 2x2 tables.

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

Assessment of study quality
The studies were assessed for randomisation methods and the reporting of withdrawals and drop-outs. Two reviewers independently assessed validity and resolved any disagreements through re-examination of the paper. Where necessary, the authors were contacted for clarification of study methods.
Data extraction
Two reviewers independently extracted the data and resolved any disagreements through re-examination of the paper. For each study, the reviewers extracted the mean recovery times (with standard error, SE) and the numbers of patients with PONV-related outcomes for each treatment group, and the mean difference between treatments in outcomes (with SE for time difference and 95% confidence intervals, CIs, for PONV differences). Where necessary, the authors were contacted for clarification of the results. Risk differences for PONV outcomes were calculated using the Mantel-Haenszel method.

Methods of synthesis
How were the studies combined?
The studies were combined using a random-effects meta-analysis. Pooled time differences with 95% CIs were calculated from raw data. Pooled risk differences in PONV with 95% CIs were also calculated.

How were differences between studies investigated?
Spearman's rank correlation was used to examine the relationship between average treatment difference for each study and the number of patients randomised, year of study, average age of the patients, average duration of surgery and anaesthesia, percentage of nitrous oxide, percentage of female patients, and the study's overall value at end point.

Results of the review
Twenty-five RCTs (n=1,498) were included.

Recovery from anaesthesia.
There was no significant correlation between any measure of recovery from anaesthesia and study characteristics.

Compared with sevoflurane, patients receiving desflurane obeyed commands 1.7 minutes sooner (95% CI: 0.7, 2.7, P<0.001), were extubated 1.3 minutes sooner (95% CI: 0.4, 2.2, P=0.003) and were orientated 1.8 minutes sooner (95% CI: 0.7, 2.9, P<0.001). There was no significant difference between desflurane and sevoflurane in the time to discharge from phase I PACU (95% CI of difference for desflurane minus sevoflurane: -1 minute, +6.6 minutes, P=0.07) or the time to discharge home (95% CI of difference: -6.2 minutes, +11.6 minutes, P=0.28).

PONV (22 RCTs, n=1,382).
There were no significant differences between sevoflurane and desflurane for early or late nausea, vomiting or treatment.
No significant correlation was found between any of the PONV-related outcomes and any study characteristic.

Authors' conclusions
There were no significant differences between sevoflurane and desflurane for PONV. Desflurane reduced the time to follow commands, extubation and orientation by 1.0 to 1.2 minutes.

CRD commentary
The review addressed a clear question in terms of the participants, intervention, outcomes and study design, although the inclusion criteria were specific for intervention and study design only. Only one database was searched and this might have resulted in the omission of other relevant studies. No attempt to locate unpublished studies was made, thus raising the possibility of missing relevant data and publication bias. It was unclear whether any language limitations had been applied, so the potential for language bias could not be assessed. Methods were used to minimise errors and bias in the validity assessment and data extraction processes, but it was unclear whether similar steps were taken when selecting the studies. Validity was assessed using established criteria but the results of this assessment were not reported.

There was little information on the individual studies. The studies were pooled using a meta-analysis, but statistical
heterogeneity was not assessed and it was difficult to judge whether pooling was appropriate because no meta-analysis graphs were drawn. However, the influence of various factors on the results was explored. It was difficult to assess the reliability of the authors' conclusions given the limited search, lack of reporting of study quality, and lack of an assessment of heterogeneity among studies.

**Implications of the review for practice and research**
The authors did not state any implications for practice or further research.

**Funding**
Abbott Laboratories.

**Bibliographic details**

**PubMedID**
15658074

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Adult; Aged; Anesthesia Recovery Period; Child, Preschool; Humans; Isoflurane /administration & dosage /adverse effects /analogs & derivatives /pharmacokinetics; Methyl Ethers /administration & dosage /adverse effects /pharmacokinetics; Middle Aged; Postoperative Care /statistics & numerical data; Postoperative Nausea and Vomiting /chemically induced /epidemiology; Randomized Controlled Trials as Topic /methods; Recovery Room; Surgical Procedures, Operative /methods; Time Factors

**AccessionNumber**
12005009804

**Date bibliographic record published**
31/05/2006

**Date abstract record published**
31/05/2006

**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.