Omitting nitrous oxide in general anaesthesia: meta-analysis of intraoperative awareness and postoperative emesis in randomized controlled trials

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Authors' objectives
To carry out a meta-analysis of randomised controlled trials (RCTs) to test the evidence that general anaesthetics which omit nitrous oxide are associated with a decreased incidence of post-operative nausea and vomiting.

Searching
MEDLINE was searched from 1966 to May 1995 for articles published in any language, using the keywords 'nitrous oxide' and 'vomiting' or 'nausea'. Reference lists of retrieved articles and review articles relating to post-operative nausea and vomiting were examined. Unpublished works were not sought, and abstracts were not considered.

Study selection
Study designs of evaluations included in the review
RCTs were included.

Specific interventions included in the review
Administration of general anaesthetic with and without nitrous oxide.

Participants included in the review
Surgical patients, adults and paediatrics were included.

Outcomes assessed in the review
Post-operative nausea and vomiting or retching (early and late, i.e. 6 and 48 hours). Intra-operative awareness.

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

Assessment of study quality
The quality assessment was carried out using a 3-item scale. Each paper was scored independently by three reviewers, with discrepancies settled through discussion and consensus scores assigned.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.

Methods of synthesis
How were the studies combined?
The odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using a fixed-effect model. The numbers-needed-to-treat (NNT) and 95% CIs were also calculated.

How were differences between studies investigated?
Differences between the studies were investigated by subgroup analysis, stratified by the risk of side-effects.

Results of the review
Twenty-four RCTs involving 2,478 patients were included.

Early and late post-operative nausea: omission of nitrous oxide showed no effect; ORs were 1.3 (95% CI: 0.9, 1.8) and 1.1 (95% CI: 0.9, 1.5), respectively, and NNT 30 and 36.9.

Early and late vomiting: omission of nitrous oxide showed a statistically-significant improvement; ORs were 2.4 (95% CI: 1.7, 3.3) and 1.5 (95% CI: 1.2, 1.8), respectively, and NNT 11.8 and 13.8.

Subgroup analysis based on baseline risk. Early vomiting (16 studies): low baseline risk, OR 1.4 (95% CI: 0.8, 2.4); high baseline risk, OR 3.1 (95% CI: 2.1, 4.6). Late vomiting (12 studies): low baseline risk, OR 1.2 (95% CI: 0.9, 1.6); high baseline risk, OR 2.1 (95% CI: 1.5, 2.9).

Intra-operative awareness (7 studies): the NNT for 1 patient experiencing intra-operative awareness with a nitrous oxide-free anaesthetic, compared with a regime with nitrous oxide, was 46.2; the OR was 4.5 (95% CI: 1.1, 18).

**Authors' conclusions**
The omission of nitrous oxide from general anaesthetics had no impact on early or late post-operative nausea or on complete emetic control. However, it does decreases post-operative vomiting significantly if the baseline risk of vomiting is high. The clinically-important risk of intra-operative awareness with a nitrous oxide-free anaesthetic reduces the usefulness of this method of preventing post-operative vomiting.

**CRD commentary**
The authors say that a quality assessment was carried out, yet no results of this assessment are included in the report. The authors do a subgroup analysis of patients at 'high risk' of vomiting, but the subgroups are formed using different cut-off points (17 and 30% in the early and late vomiting groups, respectively). The authors draw conclusions regarding the effect of intra-operative awareness, despite only 7 of the 24 studies reporting this as an outcome. There is no indication in the search strategy that the authors were looking for studies that included this as an outcome, therefore, the results relating to this outcome cannot be considered comprehensive.

The tables from this review are available on the Bandolier website (see Other Publications of Related Interest).

**Bibliographic details**

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**Other publications of related interest**
Additional data relating to this study are available on the following website: http://www.jr2.ox.ac.uk/bandolier/painres/120/120x.html (accessed July 1996).

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Anesthesia, General; Anesthetics, Inhalation /adverse effects; Awareness /drug effects; Humans; Intraoperative Period;
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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.