Does supplemental oxygen reduce postoperative nausea and vomiting? A meta-analysis of randomized controlled trials

Orhan-Sungur M, Kranke P, Sessler D, Apfel CC

CRD summary
This review concluded that supplemental oxygen did not significantly reduce postoperative nausea and vomiting and could no longer be recommended as an effective intervention to prevent this. The authors’ conclusions appeared to reflect the more recent evidence, but potential for bias in the review should be borne in mind.

Authors’ objectives
To assess the effects of supplemental oxygen on the reduction of postoperative nausea and vomiting (PONV).

Searching
MEDLINE (from 1996), Science Citation Index and The Cochrane Library (Issue 4, 2004) were searched without language restrictions up to March 2006 for relevant articles. Search terms were reported. References of identified studies were handsearched.

Study selection
Randomised controlled trials (RCTs) that compared the effects of supplemental oxygen (where patients received high 80% supplemental oxygen concentration) and air (where patients received low 30% to 40% oxygen concentration) on PONV in patients who underwent general anaesthesia were eligible for inclusion. The main outcomes of interest were presence and absence of nausea, vomiting and/or retching.

Included studies were of patients who underwent colon surgery, gynaecologic laparoscopy, thyroid surgery, abdominal and non-abdominal surgery, laparoscopic cholecystectomy, strabismus surgery, breast surgery, modified mastectomy and dental surgery. Some studies excluded patients who received oxygen plus ondansetron, droperidol or nitrogen. In some studies, oxygen was continued after surgery.

Three reviewers independently screened studies for inclusion.

Assessment of study quality
Three reviewers independently assessed included studies according to the Jadad scale of randomisation, allocation concealment, blinding and reporting of withdrawals. The maximum score was 5. Studies were also given a non-numerical assessment based on the Cochrane Reviewers’ Handbook.

Data extraction
Incidence of PONV was extracted at three time points: early (earliest reported interval within zero to six hours after surgery), late (six to 24 hours after surgery) and overall period (zero to 24 hours post surgery) and relative risks (RRs) and 95% confidence intervals (CIs) were calculated.

The authors did not state how many authors extracted data.

Methods of synthesis
A random-effects model was used to combine relative risks and 95% CIs by outcome time point. Statistical heterogeneity was assessed using the X² test and I² statistic. Subgroup analysis was undertaken by type of surgery (abdominal versus non-abdominal surgery) and by outcome (nausea, vomiting, PONV). Sensitivity analysis was undertaken by exclusion of heterogeneous studies (earlier studies that reported positive findings not reproduced by others).

Results of the review
Ten RCTs (n=1,729, range 40 to 559) were included in the review. Five RCTs scored 5 on the quality scale, two scored 4, two scored 3 and one scored 2. Results from the non-numerical assessment based on the Cochrane Reviewers’ Handbook were not reported.

There was no statistically significant difference in PONV within the first 24 hours of surgery in patients who received supplemental oxygen versus patients who received air. The findings did not alter significantly for subgroup analysis by type of surgery or when two studies that showed positive findings were excluded. There was evidence of statistical heterogeneity among abdominal surgery studies ($I^2=69\%$). Findings for nausea were similar to those for PONV, although data on statistical heterogeneity was not reported.

There were no statistically significant differences in early, late and overall time points. Subgroup analysis showed that patients who underwent abdominal surgery had significantly decreased vomiting when receiving supplemental oxygen at early (RR 0.42, 95% CI 0.22 to 0.82) and overall time points (RR 0.62, 95% CI 0.40 to 0.97); these were no longer statistically significant when the two studies that showed positive findings were excluded. Data on statistical heterogeneity was not reported.

**Authors’ conclusions**

Supplemental oxygen did not significantly reduce PONV and could no longer be recommended as an effective intervention to prevent PONV.

**CRD commentary**

The review question and inclusion criteria were clearly defined. A satisfactory literature search was undertaken without language restrictions. However, it was unclear whether attempts were made to locate unpublished data, so potentially relevant studies may have been missed. The authors assessed study quality, which was generally good. The authors performed study selection and validity assessment in duplicate; it was unclear whether this was true for data extraction and so reviewer error and bias could not be ruled out. Half of the studies included 100 patients or less. Few patient and procedural details were provided, so it was unclear whether pooling of results was appropriate. The authors went some way to investigate potential sources of heterogeneity.

The authors’ conclusions appeared to reflect the more recent evidence, but potential for bias in the review should be borne in mind.

**Implications of the review for practice and research**

**Practice:** The authors stated that supplemental oxygen (80%) should no longer be considered an effective or reliable method to reduce overall PONV.

**Research:** The authors did not state any recommendations for future research.

**Funding**

NHI grant GM 061655; Gheens Foundation; Joseph Drown Foundation; Commonwealth of Kentucky Research Challenge Trust Fund.

**Bibliographic details**


PubMedID

18499603

DOI

10.1213/ane.0b013e3181731c5a

**Original Paper URL**

Database of Abstracts of Reviews of Effects (DARE)
Produced by the Centre for Reviews and Dissemination
Copyright © 2020 University of York
Indexing Status
Subject indexing assigned by NLM

MeSH
Antiemetics /therapeutic use; Humans; Oxygen /therapeutic use; Postoperative Nausea and Vomiting /etiology /prevention & control; Randomized Controlled Trials as Topic; Risk Assessment; Treatment Outcome

AccessionNumber
12008103958

Date bibliographic record published
18/11/2009

Date abstract record published
01/12/2010

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.