Meta-analysis of desflurane and propofol average times and variability in times to extubation and following commands

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CRD summary
The review found that desflurane reduced operating room recovery time (and variability in operating room recovery time) relative to propofol. Unexplained heterogeneity in the findings mean that the authors' conclusions require very cautious interpretation.

Authors' objectives
To compare operating room recovery time associated with desflurane and propofol anaesthesia.

Searching
PubMed, Web of Knowledge and The Cochrane Library were searched from inception to January 2011. Search terms were reported. The reference lists of articles retrieved were checked. The search was restricted to studies published in peer-reviewed journals; it was not restricted by language. Meeting abstracts were excluded.

Study selection
Randomised controlled trials (RCTs) that compared desflurane and propofol and reported mean time and standard deviation to extubation and/or to follow commands were eligible for inclusion, provided there were no other differences between the groups (such as induction anaesthesia).

Mean age of participants in the included studies ranged from 18 to 77 years and mean weight ranged from 59 to 125kg. In some studies a remifentanil infusion was used for intraoperative analgesia. Some studies used a computer-controlled infusion to deliver a prespecified dose and others titrated the dose according to the depth of anaesthesia (where reported). A few studies used a laryngeal mask airway device. Mean duration of anaesthesia/surgery ranged from 20 to 342 minutes. In addition to the prespecified outcomes, the review reported differences between the groups in statistical variability (standard deviations) of time to extubation and time to follow commands.

Articles retrieved by the search were screened by one author who identified potentially abstracts and retrieved them in full text. It appeared that two authors independently selected studies for inclusion from those retrieved in full text.

Assessment of study quality
The authors considered blinding, sequence generation, allocation concealment and compliance with intervention.

Two authors independently conducted the assessment.

Data extraction
Percentage reductions in number of minutes to extubation and/or to following commands were calculated, with standard deviations. Percentage reductions in standard deviation, with 95% confidence intervals (CIs), were calculated as a measure of variability in time to recovery. Primary study authors were emailed for additional information.

Two authors extracted data independently.

Methods of synthesis
Studies were combined in a random-effects meta-analysis; data were transformed to a log scale before pooling. Generalised pivotal methods (described in the review) were used as inputs of the meta-analyses. Kendall's rank correlation coefficient was used to explore correlation between the primary outcome and its standard deviation. Publication bias was assessed using fail-safe calculations. Heterogeneity was assessed by considering the impact on findings of 10 different clinical and methodological variables (such as sample size, randomisation method, use of remifentanil, study year, mean age and weight). A sensitivity analysis excluded studies with the largest and smallest effect estimates.
Results of the review
Twenty-six RCTs were included in the review (1,502 participants, range 23 to 200). Trials were of similar quality. None of the trials was blinded. Nine trials described randomisation by random numbers table or computer generation. All participants in all studies received their allocated intervention. Only one study described allocation concealment.

When all studies were pooled, desflurane reduced the mean time to extubation relative to propofol by 21% (95% CI 4% to 36%; 17 RCTs, p=0.01) and reduced mean time to follow commands by 25% (95% CI 5% to 41%; 19 RCTs, p=0.008).

Desflurane reduced the standard deviation of time to extubation by 30% (95% CI 6% to 48%, p=0.008) and the standard deviation of time to follow commands by 40% (95% CI 26% to 52%, p<0.001). The authors noted that variability in time to recovery mattered clinically as it contributed to the incidence of prolonged extubation times.

Sensitivity analysis did not substantially affect the main findings. There was statistically significant heterogeneity (p<0.001) for each endpoint and this was not explained by the measured variables. The fail-safe test did not suggest publication bias.

Authors' conclusions
Desflurane reduced operating room recovery time (and variability in operating room time) relative to propofol.

CRD commentary
The objectives and inclusion criteria were clear. Relevant sources were searched for studies. There were no language restrictions. The restriction to articles published in peer reviewed journals meant there was potential for publication bias, but the fail-safe test did not suggest any. Steps were taken to minimise risks of reviewer bias and error by having more than one reviewer independently extract data and conduct the validity assessment; initial study selection was conducted by a single author.

Very little information was provided about study participants and settings, but from the few details given it appeared that they were clinically heterogeneous. Pooling the studies was questionable in view of the extreme heterogeneity in their findings: the difference in mean time to extubation with use of desflurane ranged from +68% to -64% and the difference in mean time to respond to commands ranged from +15% to -58%. It appeared that the analyses had significant and unexplained statistical heterogeneity (p<0.001). The clinical significance of the authors' findings about variability was hard to quantify and these outcomes were not prespecified. Study quality was suboptimal and most studies were relatively small.

Unexplained heterogeneity in the findings mean that the authors' conclusions with regard to desflurane and propofol require very cautious interpretation.

Implications of the review for practice and research
Practice: The authors stated that operating facilities could use percentage differences in recovery times between desflurane and propofol for making evidence-based pharmacoeconomic decisions.

Research: The authors stated that future trials and meta-analyses could analyse their data using the methods used in the review, with reduction in variability of task duration as a primary study endpoint.

Funding
Baxter Healthcare Corporation.

Bibliographic details

PubMedID
21630118
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.