The effect of ranitidine versus proton pump inhibitors on gastric secretions: a meta-analysis of randomised control trials

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CRD summary
The authors concluded that pre-medication of elective surgery patients with ranitidine (histamine-2 blocker) was more effective than proton-pump inhibitors in reducing the volume of gastric secretions and reducing gastric acidity. The conclusions reflected the evidence presented, but should be interpreted with caution given the potential for publication bias, reviewer error and bias, and the limitations of small sample sizes.

Authors' objectives
To compare the effect of proton pump inhibitors with histamine-2 blockers on gastric secretions.

Searching
MEDLINE, EMBASE and CINHAL were searched for publications in English. Search dates were not reported. Search terms were reported.

Study selection
Randomised controlled trials (RCTs) that compared the effect of any proton-pump inhibitor with any histamine-2 receptor antagonist (histamine-2 blocker) on volume and pH (acidity) of gastric fluid aspirates were eligible for inclusion.

Included trials evaluated patients admitted for elective surgery. Histamine-2 blockers used in the trials included ranitidine, famotidine and lafutidine. Proton-pump inhibitors administered were varied and included omeprazole, lansoprazole, pantoprazole, and rabeprazole. The doses of ranitidine ranged from 50 to 300mg. The doses of proton-pump inhibitors ranged from 20 to 80mg. Where reported, preoperative fasting times ranged from four to 10 hours. The oral route of administration was used in the majority of trials. The time between administration of medications and aspiration of gastric contents ranged from one to six hours. Outcomes assessed were volume of gastric fluid and the pH of gastric contents.

The authors did not state how many reviewers assessed studies for inclusion.

Assessment of study quality
Trial quality was assessed using the Jadad score; further details were not reported.

The authors did not state how many reviewers assessed trial quality.

Data extraction
Data were extracted on standardised mean differences (SMDs) with 95% confidence intervals (CIs) of volume of gastric fluid, and weighted mean difference (WMD) with 95% confidence intervals of the pH of gastric contents.

The authors did not state how many reviewers extracted data.

Methods of synthesis
Pooled differences in gastric aspirate volumes after histamine-2 antagonist and proton-pump inhibitor administration were compared by calculating the standardised mean difference with 95% confidence intervals. Pooled differences in pH after histamine-2 antagonist and proton-pump inhibitor administration were compared by calculating the weighted mean difference with 95% confidence intervals.

Heterogeneity was assessed visually using forest plots and numerically with $X^2$ test.
Publication bias was assessed using a funnel plot (‘fill and trim method’), Begg’s rank correlation method and Egger regression method.

Results of the review
Seven RCTs were included (n=445 patients). Only three trials were adequately powered. Only two trials were considered good quality (Jadad score of 3 or more).

Proton-pump inhibitors were associated with a statistically significant increase in the volume of gastric secretion (SMD 0.22, 95% CI 0.04 to 0.41; seven RCTs) compared with ranitidine (histamine-2 blocker).

Proton-pump inhibitors were associated with significantly lower pH value of gastric secretions (WMD -0.85 pH, 95% CI -1.14 to -0.28; seven RCTs) compared with ranitidine.

No significant heterogeneity between included trials (p=0.545) was detected.

Authors’ conclusions
Pre-medication with ranitidine was more effective than proton-pump inhibitors in reducing the volume of gastric secretions and increasing gastric pH.

CRD commentary
The review question was clearly stated. A number of relevant databases were searched, but the apparent restriction to English publications may have introduced language bias. There was no apparent search for unpublished papers, so some potentially relevant papers may have been missed. Publication bias was reported to have been assessed, but the results were not reported. Review processes were not reported, so reviewer error and bias could not be ruled out.

The quality of included trials was assessed using an appropriate tool, but it was unclear whether the results of quality assessment were used in the synthesis of results. The decision to pool trial results statistically was justified given the lack of evidence of heterogeneity. The authors acknowledged the limitations of small sample sizes of included trials.

The authors’ conclusions reflected the evidence presented, but should be interpreted with caution given the potential for publication bias, reviewer error and bias and the limitations of small sample sizes.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that future research comparing the benefits of proton-pump inhibitors with histamine-2 blockers should focus on the type of histamine-2 blocker used and preoperative duration of therapy, particularly in patients at higher risk of aspiration.

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Bibliographic details

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Other publications of related interest
Clark K, Lam L, Currow D. Reducing gastric secretions: a role for histamine 2 antagonists or proton pump inhibitors in malignant bowel obstruction? Supportive Care in Cancer 2009;17(12):1463-1468.

Indexing Status
Subject indexing assigned by NLM

MeSH
Anti-Ulcer Agents /therapeutic use; Gastric Juice /drug effects /secretion; Humans; Hydrogen-Ion Concentration /drug effects; Intraoperative Complications /prevention & control; Pneumonia, Aspiration /prevention & control; Premedication /methods; Proton Pump Inhibitors /therapeutic use; Randomized Controlled Trials as Topic; Ranitidine /therapeutic use; Treatment Outcome

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.