

Prevention of Ventilator-Associated Pneumonia:

Peptic Ulcer Disease (PUD) Prophylaxis



Rationale for PUD prophylaxis

- Critically ill patients who require mechanical ventilation are at increased risk for gastrointestinal bleeding from stress ulcers

Borrero E et al Comparison of antacid and sucralfate in the prevention of gastrointestinal bleeding in patients who are critically ill. Am J Med 1985;79:Suppl 2C:62-4

Noseworthy TW et al . A randomized clinical trial comparing ranitidine and antacids in critically ill patients. Crit Care Med 1987;15:817-9.

Shuman RB et al Prophylactic therapy for stress ulcer bleeding: a reappraisal. Ann Intern Med 1987;106:562-7.

Rationale for PUD prophylaxis

- Decreasing pH of gastric contents may protect against a greater pulmonary inflammatory response to aspiration of gastrointestinal contents. The effects of aspirating acidic contents may be worse than those with a higher pH.
- Reduce volume of gastric juice

Randomised trials of prophylaxis against stress ulcers, as compared with no prophylaxis, indicate that H2-receptor antagonists prevent clinically important gastrointestinal bleeding.

Cook DJ et al. Stress ulcer prophylaxis in critically ill patients: resolving discordant meta-analyses. JAMA 1996;275:308-14

Respiratory failure and coagulopathy are the strongest risk factors for clinically important gastrointestinal bleeding

- *Kamada T et al Gastrointestinal bleeding following head injury: a clinical study of 433 cases. J Trauma 1977;17:44-7*
- *Schuster DP et al Prospective evaluation of the risk of upper gastrointestinal bleeding after admission to a medical intensive care unit. Am J Med 1984;76:623-30.*
- *LaCroix J et al Frequency of upper gastrointestinal bleeding in a pediatric intensive care unit. Crit Care Med 1992;20:35-42*
- *Cook DJ et al. Risk factors for gastrointestinal bleeding in critically ill patients. N Engl J Med 1994;330:377-81*

A Comparison of Sucralfate and Ranitidine for
the Prevention of Upper Gastrointestinal
Bleeding in Patients requiring
Mechanical ventilation

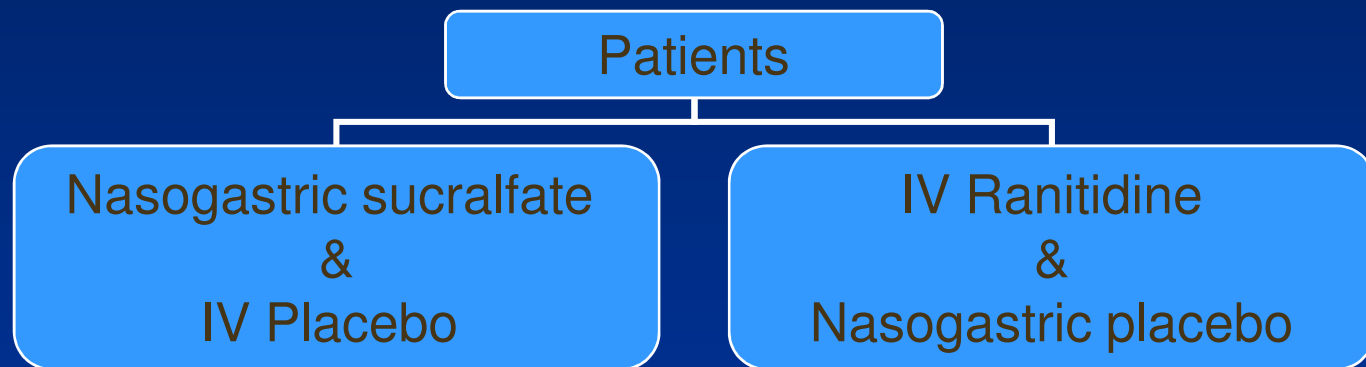
Cook et al NEJM 1998;338(12):791-797

For the Canadian Critical Care Trials Group

- Multicenter, randomised, blinded, placebo-controlled trial
- 1200 patients, 16 centres
- Mechanically ventilated
- Exclusion criteria

Diagnosis of gastrointestinal bleeding or pneumonia on admission, gastrectomy, a prognosis considered to be hopeless, previous randomisation in this or another trial, or receipt of two or more previous doses of open-label prophylactic therapy.

- Sucralfate (1 gm 6H) versus H2 receptor antagonist (ranitidine 50mg 8H) for prevention of UGIB



Results

- UGIB: 10/596 (1.7%) for ranitidine group
23/604 (3.8%) for sucralfate group
RR 0.44; 95% CI 0.21-0.92 p=0.02
Statistically different
- VAP: 114/596 (19.1%) for ranitidine group
98/604 (16.2%) for sucralfate group
RR 1.18 95% CI 0.92-1.51 p=0.19
No difference
- ICU mortality: 23.5% for ranitidine
22.8% for sucralfate
No difference
- Duration of ICU stay: 9 days
No difference

Conclusions

- Patients receiving H2 receptor antagonists (ranitidine) had a significantly lower risk of gastrointestinal bleeding than patients receiving sucralfate
- No significant difference in the rates of VAP between H2 receptor antagonists and sucralfate
- Trend toward a lower rate of pneumonia among patients receiving sucralfate.

- It is possible that sucralfate appears to have a small protective effect against pneumonia

Laggner Anaesthesist 1988;37:704-10.

Pickworth Crit Care Med 1992;20:Suppl:S95.

Garcia-Labattut et al Intensive Care Med 1990;16:Suppl 1:S19

Eddleston JM Crit Care Med 1991;19:1491-6.

Cannon LA Arch Intern Med 1987;147:2101-6.

Ben-Menachem T Ann Intern Med 1994;121:568-75.

Ryan P, Arch Surg 1993;128:1353-7

Fabian TC, Arch Surg 1993;128:185-91

Levy MM, Crit Care Med 1993;21:Suppl:S181

Mustafa NA Intensive Care Med 1995;21:287

Thomason M Crit Care Med 1995;23:Suppl:A93.

Ruiz-Santana S Crit Care Med 1991;19:887-91.

Simms HH J Trauma 1991;31:531-6.

H₂-receptor antagonists

- H₂-receptor antagonists increase the gastric pH may increase the incidence of pneumonia.

- The higher gastric pH is associated with
 - gastric microbial growth

Atherton ST, White DJ. Stomach as source of bacteria colonising respiratory tract during artificial ventilation. Lancet 1978;2:968-9

- tracheobronchial colonisation

du Moulin GC, Paterson DG, Hedley-White J, Lisbon A. Aspiration of gastric bacteria in antacid-treated patients: a frequent cause of postoperative colonisation of the airway. Lancet 1982;1:242-5

- nosocomial pneumonia

Craven DE, Kunches LM, Kilinsky V, Lichtenberg DA, Make BJ, McCabe WR. Risk factors for pneumonia and fatality in patients receiving continuous mechanical ventilation. Am Rev Respir Dis 1986;133:792-6.

H2-receptor antagonists

Direct comparisons of trials of H2-receptor antagonists with no prophylaxis, which show a trend toward higher rates of pneumonia among the patients receiving H2-receptor antagonists (odds ratio, 1.25; 95 percent confidence interval, 0.78 to 2.00)

Cook DJ et al. Stress ulcer prophylaxis in critically ill patients: resolving discordant meta-analyses. JAMA 1996;275:308-14.

Evidence-Based Clinical Practice Guideline for the Prevention of VAP

Peter Dodek, Deborah Cook, Daren Heyland et al
Ann Intern Med 2004;141:305-313

- In patients at very low risk for clinically important bleeding (eg spontaneously breathing without coagulopathy), best option to minimise risk for VAP is to avoid PUD
- In high risk patients (MV, coagulopathy), risk of bleeding should be balanced against risk for VAP
- Based on 2 level 2 trials, use of sucralfate does not influence incidence of VAP compared with placebo
- Recommendations: Not to use sucralfate to prevent stress ulcer bleeding

Surviving Sepsis Campaign Guidelines Critical Care Med 2004

- H2 receptor antagonists are more efficacious than sucralfate and are the preferred agents.
- Proton pump inhibitors have not been assessed in a direct comparison with H2 receptor antagonists and therefore, their relative efficacy is unknown

- Association between PUD prophylaxis and decreasing rates of VAP is unclear
- From experience, when PUD prophylaxis is applied as part of a package of interventions for ventilator care, VAP rates decrease precipitously

Implementation

Every patient that receives mechanical ventilation must be prescribed

- IV Ranitidine 50 mg 8H
- IV Ranitidine 50 mg 12 H (renal failure)
- Change to oral ranitidine 150 mg nocte once patient on established enteral feeding
- Continue until patient discharged from ICU

Recommendations to improve compliance of prescribing Peptic ulcer prophylaxis

- Include PUD as part of ICU order on admission in drug chart
- Include PUD as an item for discussion on daily ward rounds
- Empower nurses to remind doctors to prescribe PUD if the drug had not been prescribed
- Empower pharmacists to review orders for patients in the ICU to ensure that PUD has been prescribed and given by nurses
- Post Compliance with the intervention in a prominent place in your ICU to encourage change and motivate staff

Recommendations

- Patients at high risk for gastrointestinal bleed (mechanical ventilation, coagulopathy)-prescribe H2 antagonist. Do not use sucralfate
- Avoid PUD prophylaxis in patients low risk for gastrointestinal bleed

What Would I Want?

- A good ICU nurse
- If you intubate and ventilate me, please don't forget to prescribe IV ranitidine
- I would also like to have DVT prophylaxis
- Clean my mouth once every shift with chlorhexidine rinse
- Initiate enteral feeding by 24 hours via an oro-gastric tube and follow an enteral protocol
- Keep my head elevated ≈ 30 degrees
- Do not prescribe unnecessary antibiotics and sedation for me
- Extubate me as soon as possible
- And please, wash your hands before and after you touch me



