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


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

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

1. **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

2. **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

- **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.

Ryan P. Arch Surg 1993;128:1353-7
Fabian TC, Arch Surg 1993;128:185-91
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
  

- tracheobronchial colonisation
  

- nosocomial pneumonia
  
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)

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
- 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 decreases 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?

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