Evaluation of a pharmacist-driven stress ulcer prophylaxis protocol in a community hospital setting

Kyle Stupca, PharmD
Arlyn Brown, PharmD, BCPS, BCCCP
The speaker has no actual or potential conflict of interest in relation to this presentation.
Learning Objective

• Recognize the impact of a pharmacist-driven stress ulcer prophylaxis discontinuation protocol on prescribing habits of acid suppressive therapy in a community hospital
Mercy Hospital — Springfield, Missouri

- 886-bed acute care community hospital
- Level 1 adult trauma, STEMI, and burn center
- Level 2 pediatric trauma, and stroke center
- Fully integrated electronic health record system with computerized physician order entry
Background

### Stress-related mucosal disease

- Acute, erosive gastritis ranging from stress-related injury to stress ulcers
- Reported incidence ranges from 75% to 100% in critically ill patients

### Stress ulceration

- Deep mucosal damage penetrating the submucosa with high risk for bleeding
- Reported frequency of gastrointestinal bleeding is 2.6%
Background
Pathophysiology

Hypoperfusion of the upper gastrointestinal mucosa
Increased hydrogen ions, oxygen radicals, and toxic substances
Mucosal damage and ulceration

Background
Standard of Care for Stress Ulcer Prophylaxis

• Histamine-2 receptor antagonists (H2RA)
  – Competitive inhibition of histamine at H2 receptors of the gastric parietal cells, inhibiting gastric acid secretion

• Proton pump inhibitors (PPI)
  – Suppression of gastric acid secretion through inhibition of the parietal cell $H^+/K^+$ ATP pump
Background
Long Term Effects of Acid Suppressive Therapy

• Associated with nationally observed increases in rates of *Clostridioides difficile* and nosocomial pneumonia

  - Decreased gastric acidity
  - Bacterial overgrowth
  - Translocation

• Additional risks associated with acid suppressive therapy:
  - Bone fractures
  - Hypomagnesia and vitamin deficiencies
  - Thrombocytopenia

Background

ASHP Therapeutic Guidelines on Stress Ulcer Prophylaxis

• Mechanical ventilation > 48 hours
• Coagulopathy
  – Platelet count < 50, INR > 1.5, or PTT 2x baseline
• GI bleed within the last year
• Traumatic brain injury
  – GCS < 10 or unable to obey simple commands
• Major burns affecting > 35% of the body surface area
• Multiple trauma or spinal cord injury
• Hepatic insufficiency
  – Total bilirubin level > 5 mg/dL, AST > 150 U/L, or ALT > 150 U/L
• Two of the following
  – Sepsis
  – ICU stay > 7 days
  – Occult bleeding
  – Steroids with a daily dose > 250 mg of hydrocortisone
Background

- Stress ulcer prophylaxis is administered without an indication at rates as high as 68.1%.
- Once initiated, prophylaxis is continued in 81.2% of patients transferred from the ICU.
- Patients are at risk of being continued on stress ulcer prophylaxis at hospital discharge.

## Background

Impact of a clinical pharmacist stress ulcer prophylaxis management program on inappropriate use in hospitalized patients

<table>
<thead>
<tr>
<th>Objective</th>
<th>Evaluate the clinical and economic impact of a novel pharmacist-managed stress ulcer prophylaxis program in ICU and general ward patients</th>
</tr>
</thead>
</table>
| Outcomes Measures | • Mean percentage of patient days of inappropriate stress ulcer prophylaxis  
• Incidence of hospital acquired adverse clinical outcomes  
• Drug acquisition costs |
| Design | Single center, retrospective, pre- and post study (N = 1134) |
| Results |  |
| |  |
| | | **Pre** | **Post** | **P Value** |
| Inappropriate Use | 14.4% | 6% | < 0.001 |
| Inappropriate Cont. | 67.8% | 38.9% | < 0.001 |
| Inappropriate DC | 29.9% | 3.6% | < 0.001 |
| **Total Costs** |  |
| ICU | $6247.17 | $1752.21 | < 0.001 |
| General Ward | $13,805.53 | $1528.28 | < 0.001 |
| Limitations | Single center, retrospective evaluation  
Single post-implementation period |
Primary Objective

Evaluate the effects of a pharmacist-driven stress ulcer prophylaxis discontinuation protocol on...

- Incidence of inappropriate acid suppressive therapy prescribed in the critical care unit and general medical unit
Secondary Objectives

Evaluate the effects of a pharmacist-driven stress ulcer prophylaxis discontinuation protocol on...

- Incidence of inappropriate acid suppressive therapy prescribed in the critical care unit
- Incidence of inappropriate acid suppressive therapy prescribed in the general medical unit
- Continuation of acid suppressive therapy without an indication upon transfer from the critical care unit
- Continuation of acid suppressive therapy without an indication upon discharge from the hospital
- Medication cost savings
Mercy Protocol

Upon identification, Mercy Springfield clinical pharmacists will discontinue inappropriate acid suppressive therapy in adult patients

**Indications for stress ulcer prophylaxis**
- Mechanical ventilation
- Coagulopathy
- History of GI bleed
- Traumatic brain injury
- Trauma or spinal cord injury
- Hepatic failure
- Two of the following:
  - Sepsis
  - ICU stay > 7 days
  - Occult bleeding
  - High dose steroid use

**Treatment indications for acid suppressive therapy**
- Acute upper GI bleed
- Barrett’s esophagus
- Erosive esophagitis
- Gastric bypass
- Gastric or duodenal ulcer
- Gastroesophageal reflux
- *H pylori* treatment
- Post cardiac surgery
- Severe allergic reactions
- Zollinger-Ellison Syndrome
- Use prior to admission
Methods

Study Design

Single Center

Retrospective chart review

Study period: July 1, 2019 to January 31, 2020
Methods
Statistical Analysis

• To achieve 80% power with a 5% significance level, a sample size of 400 total patients was required to detect a 50% reduction in inappropriate therapy

• Descriptive statistics represented as frequencies and percentages

• Study outcomes addressed using the chi-square test for categorical data

• Costs data presented in dollars per 100 patients
# Methods

## Inclusion and Exclusion Criteria

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Aged 18 years or older</td>
<td>• Received pantoprazole infusion for the treatment of acute upper gastrointestinal bleeding</td>
</tr>
<tr>
<td>• Received pantoprazole, famotidine, ranitidine or lansoprazole during inpatient visit</td>
<td></td>
</tr>
</tbody>
</table>
Methods

Before Protocol

254 charts reviewed
121 ICU patients
133 Medical Surgical patients

54 patients excluded
for receiving a pantoprazole infusion

200 patients included
100 ICU patients
100 Medical Surgical patients

After Protocol

255 charts reviewed
126 ICU patients
129 Medical Surgical patients

55 patients excluded
for receiving a pantoprazole infusion

200 patients included
100 ICU patients
100 Medical Surgical patients
Results

Total Population

- Inappropriate at initiation, % (n):
  - Before Protocol: 26 (52)
  - After Protocol: 11 (22)
  - p = 0.40

- Inappropriate at discharge, % (n):
  - Before Protocol: 5 (4)
  - After Protocol: 3 (3)
  - p < 0.001
Results

Intensive Care Unit

Inappropriate at initiation, % (n)  
Before Protocol: 14 (14)  
After Protocol: 2 (2)  
$p = 0.002$

Inappropriate at transfer, % (n)  
Before Protocol: 23 (15)  
After Protocol: 12 (7)  
$p = 0.09$

Inappropriate at discharge, % (n)  
Before Protocol: 2 (1)  
After Protocol: 0 (0)  
$p = 0.30$
Results

Medical Surgical Unit

Inappropriate at initiation, % (n)
- Before Protocol: 38 (38)
- After Protocol: 20 (20)

Inappropriate at discharge, % (n)
- Before Protocol: 7 (3)
- After Protocol: 4 (3)

$p < 0.001$

$p = 0.49$
Results
Indications for Acid Suppressive Therapy

Before Protocol (n = 200)

- PTA Med: 84
- Not Indicated: 52
- Intubated: 34
- Trauma: 9
- GERD/Esophagitis/GI Bleed: 9
- Other*: 12

After Protocol (n = 200)

- PTA Med: 91
- Not Indicated: 22
- Intubated: 34
- Trauma: 42
- GERD/Esophagitis/GI Bleed: 7
- Other*: 4
## Results

### Cost Analysis

<table>
<thead>
<tr>
<th>Unit</th>
<th>Cost of Inappropriate Use ($ per 100 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Before</strong></td>
</tr>
<tr>
<td>ICU + Medical Surgical</td>
<td>92.33</td>
</tr>
<tr>
<td>ICU</td>
<td>12.00</td>
</tr>
<tr>
<td>Transferred out of ICU</td>
<td>13.62</td>
</tr>
<tr>
<td>Medical Surgical Unit</td>
<td>159.04</td>
</tr>
</tbody>
</table>
Conclusions

Implementation of a pharmacist-driven stress ulcer prophylaxis protocol significantly increases adherence to the best practice prescribing of acid suppressive therapy in the ICU and medical units and reduces medication costs.

Inappropriate continuation of acid suppressive therapy was not significantly reduced upon transfer from the ICU or upon discharge from the hospital as a result of the protocol.
Discussion

Strengths and Limitations

Strengths

• Power met
• Analysis of ICU and Medical Surgical Units

Limitations

• Small sample size
• Retrospective
• Short postimplementation period
• Limited generalizability
• Included patients continued on acid suppressive therapy from home
• Confounding variables
Discussion

Confounding Variables

• Pharmacist-provided education may have changed prescribing habits on its own

• Minimal pharmacist utilization outside of the ICU

• Providers required to select indications for proton pump inhibitors after implementation of the protocol
  – Impacted prescribing habits and data collection
Future Directions and Application

• Larger study necessary
  – Multiple ICUs and general units
  – Exclude patients continuing acid suppressive therapy from prior to admission
  – Evaluate clinical outcomes

• Pharmacy department education at onboarding to improve utilization

• Rx Scoring Tool implementation
References


Evaluation of a pharmacist-driven stress ulcer prophylaxis protocol in a community hospital setting

Kyle Stupca, PharmD (kyle.stupca@mercy.net)
Arlyn Brown, PharmD, BCPS, BCCCP