

Educational intervention can improve appropriateness of acid suppression therapy in hospitalized geriatric patients

Sankalp Dwivedi^{a,b}, Jaya Edukulla^a, Sindhu Rajendra^{a,c}, Sandesh Murali^{a,c}, Serge A. Sorser^b, Marc S. Piper^b, Michael Piper^b, Bradley J. Warren^b and Harsha Ramchandani^{a,d}

^aDepartment of Internal Medicine, St. Mary Mercy Hospital, Livonia, MI, USA; ^bDepartment of Gastroenterology, Providence - Providence Park Hospital, Michigan State University, Southfield, MI, USA; ^cDepartment of Internal Medicine, Navicent Health Baldwin, Milledgeville, GA, USA; ^dDepartment of Internal Medicine, Tricity Health Center, Fremont, CA, USA

ABSTRACT

Background: Inappropriate use of acid suppression (AST) therapy may lead to unnecessary harms, especially in the geriatric population. Despite this, AST remains one of the most commonly prescribed medications in the hospital. Therefore, we aimed to assess its prevalence and create educational intervention to improve the appropriateness of inpatient acid suppression therapy.

Methods: Using a time-series design, we established a historical control by performing a retrospective chart. Accepted indications for AST were based on those endorsed by the USA Food and Drug Administration and literature review. Inclusion criteria were: (1) age ≥ 65 ; (2) acid suppression therapy-initiated in the hospital; and (3) patients admitted to the medicine teaching services. We then created an educational intervention, which consisted of lectures and distribution of information pocket cards to residents. Data was collected for two months after the intervention. We used a two-tail fisher exact test and student's t-test to analyze our results.

Results: 65% of geriatric patients were inappropriately placed on acid suppression therapy, for which 13% were discharged without further indications. After the educational intervention, the inappropriate use of acid suppression therapy decreased to 45% ($P < 0.05$).

Conclusion: There is a significant overuse of AST in hospitalized geriatric patients. Educational interventions are one potential method that may help improve the appropriateness of acid suppression therapy for elderly inpatients.

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1. Introduction

Gastric acid plays an essential role in the digestion of protein by converting pepsinogen to the active form, pepsin. It also prevents against enteric infection, bacterial overgrowth and facilitates the absorption of vitamin B12, non-heme iron, and medications such as calcium and thyroxin [1]. Consequences of hypochlorhydria have been well defined in the literature: (1) Osteoporosis and Hip Fracture [2]; (2) Hospital acquired pneumonia and community acquired pneumonia [3,4]; (3) Clostridium difficile infection [5]; (4) Vitamin B 12 deficiency [6]; (5) Alteration in the lower intestinal microflora [7]; (6) Various forms of kidney injury have also been linked to the PPIs use such as acute allergic interstitial nephritis, acute kidney injury, increased incidence of chronic kidney disease and progression to end stage renal disease [8].

PPIs come under the category of one of the most commonly prescribed medications with esomeprazole and omeprazole making the list of the top 10 drugs by total prescriptions in 2015 and 2016 [9,10].

Acid suppression therapy (AST) mainly consist of Proton Pump Inhibitors (PPIs) and H2 Receptor Antagonists (H2RA). AST is one of the most commonly prescribed classes of medications in hospitalized patients.

Studies have demonstrated that many patients who are placed on AST do not have an appropriate indication [11]. Additionally, once initiated during hospitalization, there is a high likelihood these medications will be continued at the time of the discharge [12]. Accepted indications have been outlined by the USA Food and Drug Administration (USFDA) and the American Society of Health System Pharmacists (ASHP) for the use of PPIs (Tables 1 and 2) [13–17].

Furthermore, geriatric patients are at greater risks for adverse reactions to PPI (i.e., Clostridium difficile infection, pneumonia, etc.) and polypharmacy. It is currently unknown how often geriatric patients are prescribed AST in the inpatient setting. Therefore, we aimed to assess the use of AST in hospitalized geriatric patients. In addition, we also created an educational intervention to attempt to improve the appropriateness of AST prescribing in this setting.

2. Methods

2.1. Study design

Using a pretest-posttest design, we established a historical cohort by performing a retrospective chart

Table 1. USFDA approved indications for Proton Pump Inhibitors

1	Healing of erosive esophagitis
2	Maintenance of healing of erosive esophagitis
3	Treatment of gastric ulcer
4	Treatment of duodenal ulcer
5	Healing of Non-steroidal anti-inflammatory (NSAID) induced gastric ulcer
6	Symptomatic gastroesophageal reflux disease
7	Risk reduction of NSAID associated gastric ulcer
8	Risk reduction of upper gastrointestinal bleeding in critically ill patients
9	Acid Hypersecretory states such as Zollinger – Ellison Syndrome
10	Helicobacter pylori eradication in combination with antibiotics

Table adapted from Reference 13

Table 2. ASHP Defined indications for Stress Ulcer Prophylaxis

1	Mechanical Ventilation for > 48 hours
2	Coagulopathy (i.e., platelet count < 50,000; international normalized ratio (INR) > 1.5, or an activated partial thromboplastin time (aPTT) > 2 times control
3	Glasgow coma score of ≤ 10
4	Thermal injury to > 35% of the body surface area
5	History of gastrointestinal ulceration or bleeding within 1 year of admission
6	Multiple trauma (injury severity of ≥ 16)
7	Spinal Cord Injury
8	Transplantation perioperatively in the ICU
9	Hepatic Failure
10	Two or more of the following risk factors: sepsis, ICU stay of greater than 1 week, occult bleeding lasting at least 6 days and high dose corticosteroids (> 250 mg/day of hydrocortisone or its equivalent)
11	Partial Hepatectomy

Table adapted from Reference 13

review conducted at St. Mary Mercy Hospital Livonia, a 304-bed acute care hospital located in Southeastern Michigan. Charts of all patients admitted to the medicine teaching service between August 25th to October 31st, 2014 were reviewed. Inclusion Criteria were defined as: (1) Age ≥ 65 years old; (2) Acid suppression therapy-initiated in the hospital; and (3) Patients admitted to the medicine teaching services. Intensive care unit (ICU) and surgical patients as well as patients who were already on acid suppression drugs prior to their hospitalization were excluded. The primary objective was defined as the prevalence of AST in geriatric inpatient population in a non-critical setting before and after educational intervention.

2.2. Educational intervention

Educational interventions used which consisted of: (1) Distributing AST guidelines pocket cards to residents; (2) Posting the appropriate indications of AST on the resident work stations; (3) Lectures about the appropriate indications were provided at the beginning of the academic year and at the beginning of every month; and (4) Gastroenterologists and chief residents provided noon didactic sessions on AST.

2.3. Statistical analysis

Data analysis was performed using SPSS version 19 for Windows (SPSS Incorporation, Chicago, IL).

Significant tests of equality of two proportions were carried using the two tail Fischer's exact test using the graph pad. Student's t-test was used for comparing means of the continuous variables.

3. Results

Before the educational intervention, we identified 65% of the geriatric patients who were prescribed inpatient AST when it was not indicated. Thirteen percent of patients were discharged on AST without any indication. Based on these results, we decided to implement Acid Suppression Quality Improvement Initiative among patients of geriatric age group. Five hundred and twenty-five patients (≥ 65 years old) were admitted to the medicine teaching services during our study. Out of these, 112 (21%) patients met the inclusion criterion. After the educational intervention, the inappropriate use of AST decreased from 65% to 45% ($P < 0.05$) (Figure 1). The proportion of patients receiving inappropriate stress ulcer prophylaxis before and after the intervention decreased from 54% to 44% ($P = 0.16$) (Figure 2).

4. Discussions

Many practitioners view AST as harmless and there is an overestimation of the risk of stress related mucosal ulceration among the hospitalized patients. The perception that it lacks drug interactions, adverse effects and blanket orders to place all patients on stress ulcer prophylaxis are important reasons for their over use. Various patterns and predictors have been described in the literature for their overuse such as non-academic hospitalist staff, gastrointestinal prophylaxis checkbox in the order set, multiple handoffs, length of hospitalization, female sex, etc [12,18].

Effects of educating prescribers in the hospital has shown mixed results with some benefit on intermediate outcome parameters with multifaceted interventions [19]. This study does highlight that simple educational interventions can lead to positive outcomes. This educational intervention decreased the inappropriate use of AST from 65% to 45%. The proportion of patients receiving inappropriate stress ulcer prophylaxis also decreased from 54% to 44%. There were several limitations to this study as well: (1) It was a retrospective design; (2) Only a single teaching hospital was included; (3) It included only geriatric patient population and; (4) Short follow up post intervention. However, this educational intervention was found to be cost-effective and feasible. This intervention failed to increase the appropriate rate of AST prescription being close to 100% as it was solely an educational intervention trying to improve the prescribing behavior for the AST. This directs us further on other potential interventions such as

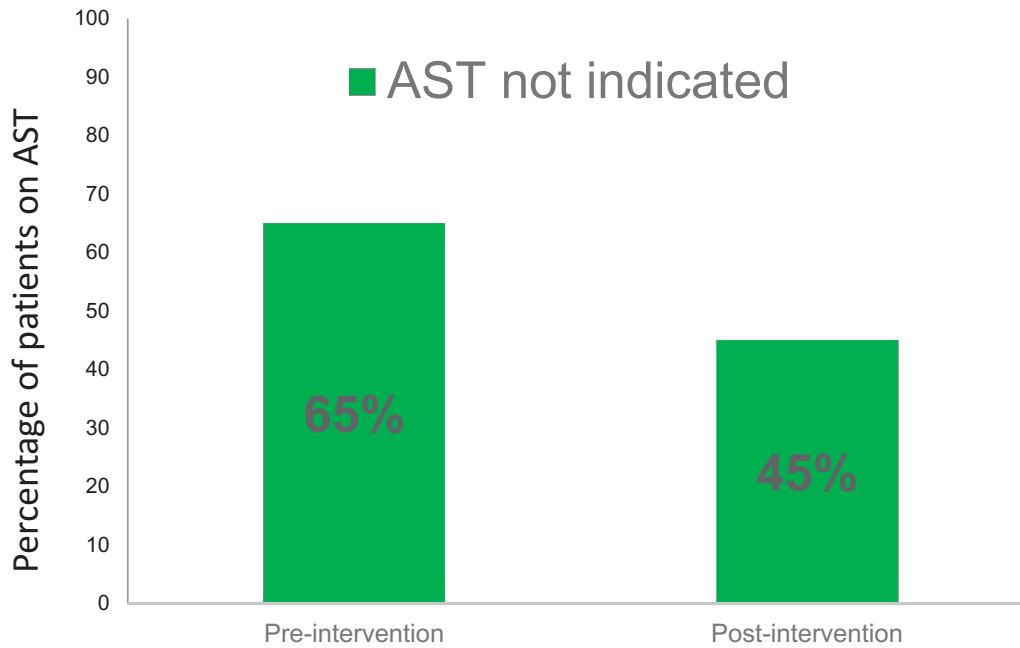


Figure 1. AST use before and after the educational intervention.



Figure 2. Percentage of patients receiving stress ulcer prophylaxis before and after intervention.

continued education of not only the residents but also educating pharmacists, nursing staff, other healthcare providers, minimizing empiric trials of PPIs, creating institutional protocols and using order sets that will prompt to enter the indication while ordering AST.

5. Conclusion

This study concludes that there continues to be significant overuse of AST in hospitalized geriatric patients. Research has shown the inappropriate use of AST may lead to unnecessary harm and increased healthcare costs. This Quasi-experiment pretest/posttest design demonstrated that repeated education could decrease the unnecessary use of AST but have limited effects. Further systemic studies should assess other interventions such as alerts in the electronic

medical records, educating other healthcare staff to assist in the appropriateness in the AST.

Disclosure statement

No potential conflict of interest was reported by the authors.

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