





Assessment of gastric-acid suppressants prescribing at an internal medicine service of a tertiary hospital in Latin America: A retrospective record review study

Evaluación de la prescripción de supresores de ácido gástrico en un servicio de medicina interna en un hospital terciario de América Latina: un estudio retrospectivo de revisión de registros

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ABSTRACT

Gastric-acid suppressants are one of the most frequently used classes of drugs worldwide. Several studies about their overprescribing have been carried out in recent years. The aim of the study was to assess the appropriateness of these drugs at an internal medicine service of a tertiary hospital in Venezuela. A retrospective record review of patients admitted to the internal medicine service from January 2020 to February 2021 was performed. Data about indications for gastric-acid suppressants, the type used, and their continuation at discharge were collected. The prescribing was grouped into two categories, appropriate or inappropriate, according to current clinical guidelines. Of the 1203 patients who were newly prescribed gastric-acid suppressants in hospital during the study period, 993 (82.5%) had an inappropriate prescription. Prophylaxis of peptic ulcers in low-risk patients was the most frequent no evidence-based indication (20.24%). Seven hundred sixty-two patients were discharged on gastric-acid suppressants. Of these, 74.7% did not have an acceptable indication to continue this treatment on an outpatient basis. Many hospitalized patients in a Venezuelan academic tertiary healthcare center were given gastric acid suppressants not in accordance with the current clinical practice guidelines.

Keywords: Gastric Acid; Prescription Drug Overuse; Proton Pump Inhibitors; Inappropriate Prescribing (source: MeSH NLM).

RESUMEN

Los supresores del ácido gástrico son uno de los grupos farmacológicos más frecuentemente prescritos en todo el mundo. En los últimos años se han realizado varios estudios sobre su prescripción inadecuada. El objetivo del estudio fue evaluar la idoneidad de estos medicamentos en un servicio de medicina interna de un hospital de tercer nivel en Venezuela. Se realizó una revisión retrospectiva de historias médicas de pacientes ingresados en el servicio de medicina interna desde enero de 2020 hasta febrero de 2021. Se recogieron datos sobre indicaciones de supresores de ácido gástrico, tipo utilizado y su continuación al alta. La prescripción se agrupó en dos categorías, adecuada o inadecuada, según las guías clínicas vigentes. Entre los 1203 pacientes a los que se les prescribió recientemente supresores de ácido gástrico en el hospital durante el período de estudio, 993 (82,5%) tenían una prescripción inapropiada. La profilaxis de úlceras pépticas en pacientes de bajo riesgo fue la indicación no basada en evidencia más frecuente (20,24%). Setecientos sesenta y dos pacientes fueron dados de alta con supresores de ácido gástrico. De estos, el 74,7% no tenía una indicación apropiada para continuar este tratamiento de forma ambulatoria. Un alto número de pacientes hospitalizados en un centro asistencial de nivel terciario en Venezuela fueron prescritos con supresores de ácido gástrico que no se ajustaban a las guías de práctica clínica vigentes.

Palabras clave: Ácido Gástrico; Uso Excesivo de Medicamentos Recetados; Inhibidores de la Bomba de Protones; Prescripción Inadecuada (fuente: DeCS Bireme).

INTRODUCTION

Acid peptic disorders are among the most prevalent gastrointestinal diseases. Only in 2014, there were over 5.6 million outpatient visits in the United States for gastroesophageal reflux disease and reflux esophagitis ⁽¹⁾. As a result, gastric-acid suppressants

(GASs), which include histamine 2 receptor antagonists (H2RAs) and proton pump inhibitors (PPIs), are one of the most frequent drug classes used in both primary and specialized health care around the world ^(2, 3). Between 2009 and 2015, approximately 600 million patients in ambulatory medical care clinics in the United States had documented GASs use ⁽⁴⁾. Since

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their release in the 1980s, PPIs have taken the place of H2RAs as first-line GASs⁽⁵⁾. Currently, this drug set is among the twenty most prescribed medications at office visits in the United States, and it is estimated that about 113 million PPI prescriptions are written every year in this country^(6,7). This fact can be explained by several factors, including their therapeutic superiority over H2RAs, their relatively safe side effect profile, good tolerance, and their over-the-counter access in many countries^(2,8).

A situation that has gained relevance over the past two decades is the overprescribing of GASs, especially PPIs, due to the potential adverse effects, as well as the increase in healthcare costs⁽⁹⁾. Several studies have shown an association between chronic use of PPIs and serious adverse effects, including *Clostridium difficile* and other enteric infections, intestinal colonization with multidrug-resistant microorganisms, hospital and community-acquired pneumonia, dementia, osteoporotic fractures, hypomagnesemia, and acute interstitial nephritis^(4, 8, 10, 11). Recent retrospective observational studies suggest a likely association between long-term, high-dose PPIs use and a low increased risk of first-time ischemic stroke, especially in elderly patients^(12,13). In terms of economic burden, GASs prescription leads to a progressive increase of public health costs. PPI prescriptions are estimated to cost approximately \$10 billion per year in the United States^(14, 15). Only in 2010, income from the sale of esomeprazole reached \$13.6 billion⁽¹⁶⁾. While in the United Kingdom, spending on PPIs reached £430 million in 2004⁽¹⁷⁾. Furthermore, it is calculated that nearly £2 billion is spent unnecessarily worldwide each year due to PPIs prescriptions^(18, 19).

For all the above reasons, interest in the overuse of GASs has increased in recent years, and a growing number of studies have been carried out worldwide. However, little research has been conducted on the inappropriate prescribing of GASs in Latin America. This study is aimed to assess the appropriateness of GASs use among patients at an internal medicine service of a tertiary-level care hospital in Venezuela.

MATERIALS AND METHODS

Ethics

This study followed the Declaration of Helsinki and was approved by the ethical review board of Escuela de Ciencias de la Salud “Francisco Battistini Casalta”, Universidad de Oriente.

Study design

We performed a retrospective record review of patients who were admitted from January 2020 to

February 2021 at the internal medicine service of Hospital Universitario “Ruiz y Páez” (HURP), Ciudad Bolívar, Venezuela. HURP is a public academic tertiary healthcare center. Patients were included in the study only once, and their subsequent readmissions were not counted. Medical records of patients whose GASs use prior to admission continued during hospitalization, age <18 years, incomplete data, critically ill patients at the time of admission, or patients requiring intensive care therapy during hospitalization were all exclusion criteria. Sample size estimation was performed by using G*Power 3.0 software^(20, 21).

Study definitions

Appropriateness of GASs prescription was defined by identifying whether patients had received such drugs according to the indications stated by the United States Food and Drug Administration (FDA), National Institute for Clinical Excellence (NICE) in the United Kingdom, the American College of Gastroenterology (ACG) and the American Gastroenterological Association (AGA)^(7, 22, 23). These approved indications are summarized in Table 1. The prescribing was grouped into two categories, appropriate or inappropriate, in accordance with the previously mentioned indications.

Data collection

Data were obtained from paper medical records. Information collected included demographic data, reason for admission, indication for the use of GASs, type of GASs used, route of administration, duration of treatment and their continuation at discharge.

Statistical analysis

In case of normal distribution, continuous variables were expressed as mean \pm standard deviation (SD) while were expressed as the median and interquartile range in nonnormal distribution. Categorical variables as frequencies and proportions. Statistical analyzes were calculated by using IBM® SPSS® Statistics 21.0

RESULTS

Among the 1868 patients admitted at the internal medicine service of HURP throughout the study period, 1203 patients (64.4%) met the inclusion criteria, as shown in the flowchart (Fig. 1). Six hundred fifty-two (54.2%) were male. The mean age was 54.9 ± 17.9 years. The most frequent admitting diagnosis was infectious diseases (19.2%), followed by cardiovascular diseases (18.5%). PPIs were the most frequently prescribed GAS in hospital (98.7%), with omeprazole being the most widely used (87.5%). The main route of administration of GASs was intravenous. The median of duration of gastric-acid suppression therapy in hospital was 7 days (table 2).

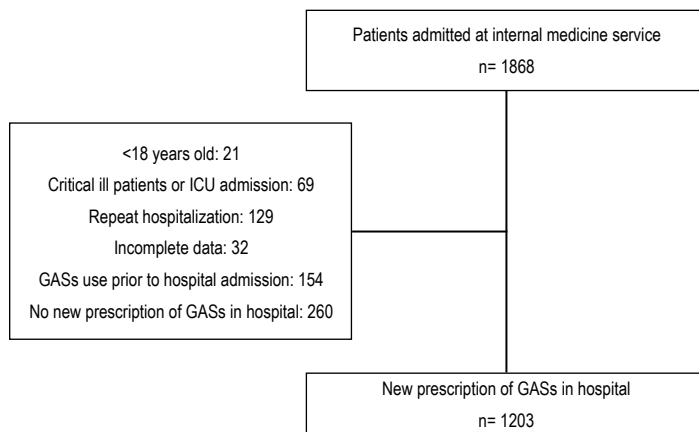


Figure 1. Flowchart of hospitalized patients included in the study

The prescriptions of GASs of two hundred ten (17.5%) patients were grouped into appropriate prescribing category in accordance with the approved indications (Figure 2). The most common indication was prophylaxis of peptic ulcers in patients aged > 65 years under treatment with NSAIDs/antiplatelets (38.57%), followed by treatment of peptic ulcers (35,24%) (Table 3). In contrast, 993 out of 1203 patients (82.5%) had inappropriate GASs prescribing. Most of these patients (61.63%) were given GASs for unknown reasons. Prophylaxis of peptic ulcers in low-risk NSAIDs users was the most frequent no evidence-based indication (20.24%) (Table 4). Seven hundred sixty-two patients were discharged on GASs. Among these patients, 74.7% (n=569) had no evidence-based reasons to continue this treatment at home (Figure 2).

Table 1. Approved indications of gastric-acid suppressants according to FDA, NICE, ACG and AGA .

Therapeutic uses	
Healing of EE	
Maintenance of healed EE	
Treatment of GERD	
Helicobacter pylori eradication in combination with antibiotics	
Pathological hypersecretory conditions (Zollinger-Ellison syndrome)	
Short-term treatment and maintenance of gastric and duodenal ulcer	
Prophylactic uses	
NSAIDs/anti-platelet agent users with increased risk:	
Age >65 years	
High-dose/multiple NSAIDs	
History of peptic ulcer disease or previous gastrointestinal bleeding	
Concurrent anticoagulant therapy, corticosteroids or SSRIs	

FDA, Food and Drug Administration; NICE, National Institute for Clinical Excellence; ACG, American College of Gastroenterology; AGA, American Gastroenterological Association; EE, erosive esophagitis; GERD, gastroesophageal reflux disease; NSAIDs, nonsteroidal anti-inflammatory drugs; SSRIs, selective serotonin reuptake inhibitors.

DISCUSSION

In this retrospective record review study, an overuse of GASs was found in most patients admitted to the internal medicine service (82.5%), with PPIs being the most frequent group of GASs prescribed. These results are consistent with those of other previous studies. For instance, a study carried out in a Spanish internal medicine service reported 73.03% of inappropriate prescribing of PPIs (24). Another retrospective clinical record review study performed in a tertiary teaching hospital in Singapore evidenced that 81.2% of the patients aged ≥65 years admitted did have no an appropriate PPIs indication according to clinical guidelines (25). In addition, Gupta et al. found that 73% of the patients who were started on GAS in an academic US hospital lacked accepted indications for their use (26).

The current study showed that prophylaxis of drug-induced ulcers in low-risk patients was the main identifiable reason for the inappropriate prescribing of PPIs (36.46%). We found that many of these prescriptions

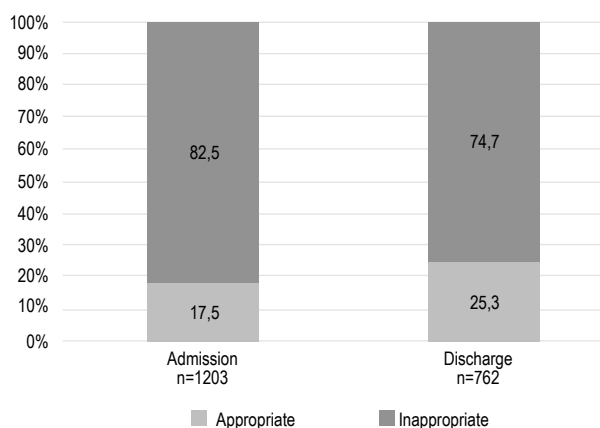


Figure 2. Appropriateness of gastric-acid suppressants prescription in hospital and at discharge.

Table 2. Patient demographics and clinical characteristics.

Variables	Values
Age (years), mean (± SD)	54.9 (±17.9)
Sex, n (%)	
Male	652 (54.2)
Female	551 (45.8)
System-based admitting diagnosis, n (%)	
Infectious diseases	231 (19.2)
Cardiovascular diseases	223 (18.5)
Neurological diseases	182 (15.1)
Respiratory diseases	154 (12.8)
Gastrointestinal and liver diseases	113 (9.4)
Renal diseases	71 (5.9)
Neoplastic diseases	68 (5.7)
Endocrine diseases	53 (4.4)
Others	52 (4.3)
Hematologic diseases	45 (3.7)
Autoimmune diseases	11 (0.9)
GAS prescribed, n (%)	
Omeprazole	1053 (87.5)
Pantoprazole	132 (11.0)
Ranitidine	16 (1.3)
Esomeprazole	2 (0.2)
Route of administration, n (%)	
Intravenous	1103 (91.7)
Oral	100 (8.3)
Duration of in-hospital treatment (days), median (IQR)	7 (3-14)
Length of hospital stay (days), median (IQR)	7 (4-15)
Discharged on GASs, n (%)	762 (63.3)

GASs, gastric-acid suppressant; IQR, interquartile range

were related to the use of NSAIDs/antiplatelet in low-risk patients, anticoagulant therapy, and corticosteroid use alone. These findings are like those reported by Meli *et al.*, who performed a one-day observational study and found that 40% of inappropriate PPI prescriptions were due to inappropriate prophylaxis of drug-induced ulcers ⁽²⁷⁾. In a retrospective study carried out in a Dutch hospital, van den Bemt *et al.* reported that nearly half of the hospitalized patients who were newly prescribed NSAIDs received PPIs not in accordance with guidelines. Additionally, those authors found that overprescribing was found to be significantly associated with coxibs use and polypharmacy ⁽²⁸⁾.

It is noteworthy in this study that more than half of the patients with inappropriate GAS prescriptions had no documented reason for their use. We theorized that

Table 3. Evidence-based appropriate indication for gastric-acid suppressants.

Indication	No. patients n = 210 (%)
Prophylaxis in NSAIDs/anti-platelet agent users with increased risk	
Age >65 years	81 (38.57)
Concurrent anticoagulant therapy	22 (10.48)
Concurrent SSRIs	12 (5.71)
Concurrent corticosteroids	11 (5.24)
Concurrent use of NSAIDs and antiplatelets	10 (4.76)
Treatment of gastric and duodenal ulcer	74 (35.24)

NSAIDs, nonsteroidal anti-inflammatory drugs; SSRIs, selective serotonin reuptake inhibitors.

this fact could be related to the no-evidence belief that patients in hospital have a higher risk of developing peptic ulcer due to polypharmacy or stress ulcer outside a critical care setting.

We found that around 75% of the patients discharge on GASs did have no supported medical evidence to continue the acid suppressive therapy. This rate is similar to that reported by Pham *et al.*, who documented that 79.1% of the patients that started PPIs continued this medication at discharge without having evidence-based reasons ⁽⁵⁾. This can be explained by the fact that there is no established program in Venezuela for the deprescribing of GASs.

In Latin America, there are few studies about the overuse of GASs. Posada *et al.* carried out a cross-sectional descriptive observational study in a teaching hospital in Colombia and found that the prevalence of inappropriate prescribing of GASs was 59.5%, with prophylaxis of bleeding due to gastrointestinal ulcers in low-risk patients being the most frequent indication ⁽³⁾. Similar findings were recorded by Bustamante-Robles *et al.* in two teaching hospitals in Lima, Peru, where the prevalence of inappropriate use of PPIs was 54,57% ⁽²⁹⁾.

Table 4. No evidence-based indication for gastric-acid suppressants.

Indication	No. patients n = 993 (%)
Unknown indication	612 (61.63)
Inappropriate prophylaxis of drug induced peptic ulcer	
Low-risk NSAIDs users	201 (20.24)
Corticosteroids	61 (6.14)
Low-risk anti-platelet agent users	50 (5.04)
Anticoagulant therapy	50 (5.04)
Pancreatitis	9 (0.91)
Acute diarrheal infection	7 (0.7)
Lower GI bleeding	3 (0.3)

NSAIDs, nonsteroidal anti-inflammatory drugs; GI, gastrointestinal

The main strength of the current investigation is that, to the best of the authors' knowledge, it was the study with the largest sample to assess the appropriateness of GASs prescribing in Latin America. There are several limitations in the present study that need to be considered. First, being a retrospective record review study, some information might not have been recorded. Indeed, this fact could be related to the high proportion of patients without a documented indication for the use of GASs. Second, in view of the retrospective design of our study, it is not possible to evaluate the decision-making process for the use of GASs. Third, we were unable to assess the duration of the treatment with GASs after the discharge because that information is not signaled in the medical records. This information is another variable to consider to assess the adequacy of treatment with GASs. Finally, the possible factors that could influence the inappropriate use of GASs were not evaluated in this study.

CONCLUSIONS

In summary, the present investigation illustrates that there is a high proportion of patients in a Venezuelan academic tertiary healthcare center that were prescribed GASs during their hospitalization not in accordance with the current clinical practice guidelines. This paper supports what prior studies in Latin America have reported about the high prevalence of inappropriate prescribing of GASs. Further research should be conducted to identify the possible causes of this overprescribing in order to develop regional strategies for the rational use of these drugs.

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