

A Study on the Prescribing Pattern of Proton Pump Inhibitors in the General Surgery Wards of Premier Medical Institute in Eastern India

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Abstract

Background: The inappropriate prescription pattern of Proton Pump Inhibitors (PPIs) is on the rise in spite of its inappropriate utilization being well known.

Aim: The purpose of this study was to evaluate the pattern of prescription and appropriateness of use with PPIs and outline potential consequences associated with the use of PPIs.

Methods: This was a prospective cross-sectional prevalence survey. All pediatric patients and patients attending the Outpatient Department were excluded. Prescribing patterns of the PPIs were analyzed by collecting the details of drug usage, including frequency, route of administration, dosage form, and duration of treatment, indications, and continuation after discharge. The prescription guidelines and references books will be used as tools to analyze the prescription and case charts.

Results: Out of the total of 343 patients studied, 182 were men, while 161 were women with a men and women ratio of 1.13:1. The majority of our patients were in the age group 50-59. The most common indication of PPI use was to prevent NSAID induced ulcer and were most commonly prescribed with analgesics. Pantoprazole (50.15%) were the PPI most commonly prescribed. 53.35% patients were prescribed 4 – 7 medicines. None of the prescriptions were categorized as inappropriate. Only 9% patients underwent upper GI endoscopy before prescription of PPI.

Conclusion: Proton pump inhibitors are an integral part of prescription in surgical wards. Most common indication for PPI use is as prophylaxis for NSAID induced ulcers. Another matter of concern is the practice of poly-pharmacy in surgical wards in India. We need to use minimum drugs per patient. Although most of the time the prescription was due to a proper indication, the use of upper GI endoscopy for dyspepsia and suspected peptic ulcer needs to be promoted.

Key word: Drug utilization, Proton Pump Inhibitors, Prescription pattern, PPI

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I. Introduction

Proton pump inhibitors (PPIs) are among the most widely sold medications in the world. These are on the World Health Organization's List of Essential Medicines.^[1] Omeprazole was the first PPI to be discovered and has been available for acid suppression since 1988. Later, other drugs have been identified and are currently available: Lansoprazole, Pantoprazole, Rabeprazole, Dexlansoprazole, and Esomeprazole.^[2]

Proton pump inhibitors (PPIs) act by blocking the gastric H,K-ATPase, inhibiting gastric acid secretion. They are very effective in healing of peptic ulcers, gastroesophageal reflux disease (GERD), Barrett's esophagus, and Zollinger-Ellison syndrome, as well as the eradication of *Helicobacter pylori* in combination regimens.^[3]

PPIs are mostly safe, although a few adverse reactions being headache, abdominal pain, nausea, diarrhea, vomiting, and flatulence have been seen.^[4] Recently studies have linked PPI use with more serious adverse effects such as increased risk of Clostridium difficile (C. difficile) infections, community-acquired and hospital-acquired pneumonia, and osteoporotic fracture, including hip fracture.^[5]

Irrational use of medicines is a worldwide problem. There are many ways that lead to an irrational use of medicines such as patient usage of too many medicines (polypharmacy), inadequate dosage, over-use of injections when oral medication can be more appropriate, prescribing the medicine that is inappropriate to clinical guidelines and self-medication.^[6]

Studies showed that more than 50% of all medicines worldwide are incorrectly prescribed or sold and 50% of patients fail to use them. A range between 10% and 20% of the national health budget in developed countries vs 20% and 40% in developing countries is spent in medicines.^{[6][7]} Thus, the irrational use of

medicines is an extremely serious problem that needs to be solved.^[8] The inappropriate prescription pattern of Proton Pump Inhibitors is on the rise in spite of its inappropriate utilization being well known. This is significantly associated with adverse drug reactions and drug-drug interactions.

Drug utilization studies are ongoing, systematic, criteria-based programs to evaluate rational medicine utilization. They are dynamic audit systems for improving the quality of medication use in hospitals and identify any suspected inappropriate prescribing behavior by identifying, documenting, and measuring the problem. If therapy is determined to be inappropriate, interventions with providers or patients will be necessary to optimize the outcomes of drug therapy.^[9]

Due to increasing reports of potentially serious adverse effects and drug-drug interactions, the possible widespread use of PPI requires further examination. The purpose of this study was to evaluate the pattern of prescription and appropriateness of use with PPIs in Patient Department (IPD) of the Department of Surgery, Rajendra Institute of Medical Sciences, Ranchi and outline potential consequences associated with the use of PPIs.

II. Material and Methods

Study design: This was a prospective cross-sectional prevalence survey carried out, from October 2019 to March 2020, in the In-patient departments (IPD) of Department of Surgery, Rajendra Institute of Medical Sciences, Ranchi. **Study population** The study was conducted in the ward, ICU, Post operative room and Casualty of Department of Surgery, RIMS Ranchi.

Sampling method The study method involves selection of patients based on the inclusion and exclusion criteria.

Inclusion Criteria All adult patients admitted in the Department of Surgery.

Exclusion Criteria All pediatric patients and patients attending the Outpatient Department.

Patient Data Collection Form: The patient data collection form was used to collect all the details like Inpatients number, Patient name, Age, Sex, Date of admission, Date of discharge, Chief complaints (c/o), History of Present Illness (HOPI), Past Medication history, Laboratory data, Culture sensitivity test, Diagnosis and Therapeutic management.

Study procedure: The patient demographic data and all relevant information was be noted. Prescription pattern was noted as, name of drug, dosage form, frequency, route of administration and duration of treatment, cost per dose, cost/day and cost during the length of hospital stay. The changes and the daily notes in the case sheets will be followed until the patient is discharged, expires or shifted to departments.

Data Analysis: Prescribing patterns of the PPIs were analyzed by collecting the details of drug usage, including frequency, route of administration, dosage form, duration of treatment, indications, and continuation after discharge. Based on 5 parameters and criteria, a medicine could have a score of minimum 0 to a maximum of 10 in the appropriateness scale. After assigning score to each medicine of a prescription with either 0 (inappropriate) or 10 (most appropriate), an average score of appropriateness for medicines in a prescription was obtained by dividing the total score of all medicines by number of medicines in that particular prescription. Then, the prescriptions were allotted to 3 categories. The potential drug-drug interactions were identified by using the software's, namely Micromedex and Medscape drug interaction checker and were categorized based on their severity. The prescription guidelines, and references books will be used as tools to review the prescription and case charts.

III. Results

Out of the total of 343 patients studied, 182 were men, i.e., 53.06% while 161 were women, i.e., 46.94%, with a men and women ratio of 1.13:1.^[Figure-1] The majority of our patients were in the age group 50-59 (n = 67, i.e., 19.53%) followed by age group 40-49 (n = 63, i.e., 18.37%), and age group 30-39 (n = 58, i.e., 16.91%), respectively, 27 patients 7.88% patients were above 70 years of age.^[Table-1]

Figure-1: Showing Gender Distribution of studied prescriptions

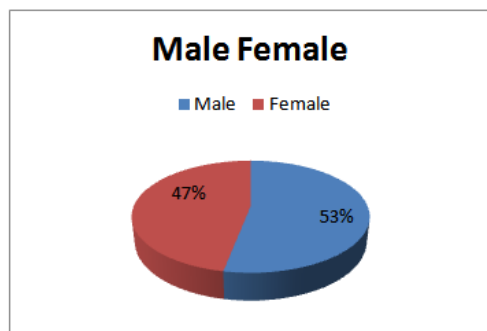


Table-1: Age Distribution of studied

Age (years)	Number of Patients (n=343)	Percentage (%)
10-19	32	9.33%
20-29	45	13.12%
30-39	58	16.91%
40-49	63	18.37%
50-59	67	19.53%
60-69	51	14.87%
70-79	23	6.71%
>=80	4	1.17%

Most common indication of PPI use in the surgical indoor was as a co-prescription with NSAIDS to prevent NSAID induced ulcer (n=114, 33.24%) or Steroids (n=24, 7%). Other indications include Cholecystitis, Peptic ulcer disease, Peptic Ulcer Perforation, and Pancreatitis etc. [Table-2] PPI were co prescribed with a number of Drugs. Most common drugs include Analgesics (n=225, 27.54%), Antimicrobials (n=205, 25.09%), Vitamins and Minerals (n=193, 23.62%). [Table-3]

Table-2: Showing Indications of PPI Use

Indications	No of Patients	Percentage %
Peptic Ulcer	45	13.12%
Peptic Ulcer Perforation	28	8.16%
Gastritis & GERD	21	6.12%
Cholecystitis	55	16.03%
Pancreatitis	32	9.33%
Burn	24	7.00%
Co Prescription with NSAIDS	114	33.24%
Co Prescription with Steroids	24	7.00%

Table-3: Showing commonly co prescribed with PPI

Drugs	No of Prescriptions	Percentage
Analgesics/NSAIDS	225	27.54%
Antacids	73	8.94%
Sucralfate	21	2.57%
Antimicrobials	205	25.09%
Vitamins/Minerals	193	23.62%
Steroids	28	3.43%
Antiemetics	72	8.81%

Majority of drug-drug interactions was caused by Rifampin + Pantoprazole, followed by Cefpodoxime + Pantoprazole. The frequency and outcomes of the potential drug-drug interactions involving PPIs are summarized in Table 4.[Table 4] Among 343 patients, Pantoprazole (50.15%) were the highly prescribed followed by Rabeprazole (33.24%) and then Omeprazole (11.08%) and Esomeprazole (5.54%). [Table-5]

Table-4: Showing Drug interactions

Drugs	Reactions	n
Cefpodoxime + Pantoprazole	Increased blood levels of cefpodoxime	2
Rifampicin + Pantoprazole	Increased blood levels of rifampin	5
Amikacin + Pantoprazole	Hypomagnesemia	1
Ferrous fumarate + Pantoprazole	Increased Absorption	1

Table-5: Showing No of Drugs prescribed per encounter

No. of medicines	Number of patients (n=343)		Total	Percentage (%)
	Male	Female		
0 – 3	54	48	102	29.74%
4-7	97	86	183	53.35%
>7	31	27	58	16.91%
Average no. of Drugs/encounter= 6.16				

Out of 343 patients, 183 patients were prescribed with 4 – 7 medicines (53.35%) per prescription followed 102 (29.71%) by 3 or less medicines per prescription and 58 (8.13%) were prescribed more than 7 medicines per prescription.[Table-6] Out of the 343 prescriptions 251 (73.18%) were categorized as ‘Most appropriate’ while 92 (26.82%) were categorized as ‘Appropriate’. None of the prescriptions were inappropriate. [Table-7] Only 32 (9%) patients of 342 underwent upper GI endoscopy before prescription of PPI.

Table-6: Showing pattern of PPI prescriptions

PPIs		Number of patients	Percentage (%)
Omeprazole	INJ	25	7.29%
	CAP	13	3.79%
Pantoprazole	INJ	149	43.44%
	CAP	23	6.71%
Rabeprazole	INJ	87	25.36%
	CAP	27	7.87%
Esomeprazole	INJ	14	4.08%
	CAP	5	1.46%

Table-7: Showing Appropriateness of PPI

Prescription	Number of prescriptions (n=343)	Percentage (%)
Most appropriate	251	73.18%
Appropriate	92	26.82%
Inappropriate	Nil	-

IV. Discussion

This prospective cross-sectional prevalence study was carried out with the aim to evaluate the pattern of prescription and appropriateness of use with PPIs and outline the potential consequences in the Department of Surgery, Rajendra Institute of Medical Sciences, Ranchi and observed that both males and females were similarly prescribed PPIs, almost all age groups studied were similarly prescribed. It was mostly prescribed as a co-prescription with NSAIDs and vitamins, antibiotics and analgesics commonly shared the same prescription with PPI. It was also observed that Rifampicin and Cefpodoxime showed drug to drug interaction. Most of the prescription we analyzed contained 3 to 7 medicines and none of the patients were inappropriately prescribed PPI. It is a matter of great concern that upper GI endoscopies were carried out in only 9% of patients, and a vast majority of patients were prescribed PPI therapy without adequate investigations. This can delay the diagnosis of gastric cancer. Authors like Axon et al have recommended referral to an endoscopy unit for high-risk group of patients aged over 45 years with new onset of dyspepsia. Similarly Haroon et al also observed only 12% of patients underwent upper GI endoscopy prior to prescription of PPI.[10][11]

Mathew et al., (2015); Echevarria et al., (2008) in their study observed that males were more than the females. Although our study found almost equal male to female ratio there was a slight male majority. Our study similar to that by Mathew et al found that most of the patients belonged to age group 50-59 years. [12.][13.] In our study it was noted that the most common indication for PPI prescription was as a prophylaxis for NSAID induced ulcers. Haroon et al in 2013 observed that majority of the prescription of PPI were to prevent NSAID induced ulcers.[11] Nousheen et al too observed similar results in their study. [14.]

Madi et al in 2019 observed that most of the time PPI were co prescribed with NSAIDs and other analgesics.[15] Similarly Patil et.al (24%) and Nousheen et.al (32%) observed that NSAIDs were co prescribed along with PPI very frequently. Rajani Patil et.al also observed that PPI were very commonly prescribed along with antimicrobial agents similar to the observation of Nousheen et.al. In our study we observed that the PPI were mostly prescribed with analgesics followed by antimicrobials and multivitamins.[16] In our study drug to drug interaction was not significantly observed. Arshad et al in their study in south India observed the average number of drugs in surgical ward per encounter was 7.04. [17] Bhansali et al too observed that poly-pharmacy was common in surgical wards and the average number of drugs per encounter was 9.03.[18] Henlte M et al on the other hand in their study from Europe observed an average of 3.8 drugs per encounter. [19]

In our study we observed an average of 6.16 drugs per encounter. This is less than that observed by Arshad et al and Bhansali et al but higher than Helte et al. Indian Surgical wards do practice poly-pharmacy and need to audit their prescription practices.

Our study shows that most commonly prescribed PPI in Surgical wards was Pantoprazole followed by Rabeprazole and Omeprazole. Patil et al too observed similar pattern with Pantoprazole (68%) as the most commonly prescribed PPI followed by Rabeprazole (35%). [16]

V. Conclusion

Proton pump inhibitors are an integral part of prescription in surgical wards. Most common indication for PPI use is as prophylaxis for NSAID induced ulcers. Another matter of concern is the practice of poly-pharmacy in surgical wards in India. This has to be discouraged. Although most of the time the prescription was due to a proper indication, the use of upper GI endoscopy for dyspepsia and suspected peptic ulcer is being ignored and needs to be promoted before prescribing PPI.

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