

Irrational Prescribing Habit of Omeprazole

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ABSTRACT

The primary aim of the study is to examine the frequency of omeprazole prescription from all the prescriptions received by a pharmacist in a single day. Besides, the author examines the cost of dispensed omeprazole. This research is inspired by the fact that medication errors were the leading cause of severe physical injury and death to patients. Additionally, such preventable errors are also associated with intense financial, emotional as well as psychological stress to both healthcare providers and the healthcare organization in general. The study adopted a cross-sectional study through collecting as well as the screening of all the prescription orders undertaken in one day from 7:30 am to 1:45 pm. The research found that a prescription error leads to wastage of the resources with estimated annual cost of 336,415.56 for omeprazole as well as 431037.984 USD for ranitidine while at the same time necessitates the rational prescription habit to suppress the detrimental effects of omeprazole and ranitidine.

Keywords: Cost, Omeprazole, Pharmacy service, Prescription, Ranitidine.

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INTRODUCTION

In 2017, World health organization (WHO) reported that the cost associated with medication errors was US\$ 42 billion annually. In the same year, WHO launched the worldwide patient safety challenge on medication safety in an attempt to lower the harm associated with medication by fifty percent world over by 2022.^{1,2} The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) endorsed adapting dosing guideline in their strategy to enhance medication use and prevent errors.³ Hence, the role of pharmacists in patient care and the reduction of medication errors are very important. It has been researched for its high significance in pharmacy training courses.⁴

Medication errors were the leading cause of unadorned physical injury as well as death to patients. Additionally, such preventable errors are also associated with intense financial, emotional, and mental stress to both healthcare providers and the healthcare organization in general. On the other hand, cost avoidance has been proven in many past studies. One study indicates that the participation of clinical pharmacists in hospitals can help prevent medication errors, reduce preventable adverse drug events as well as reduce the overall costs of healthcare.⁵ Adverse Drug Events refer to patient injuries resulting from medication use and leading to harm

and loss of function. Similarly, the study by Bates and Slight⁶ agrees that the deployment of an on-ward clinical pharmacist can reduce preventable Adverse Drug events and minimize the overall costs of healthcare.

Omeprazole, classified under the proton pump inhibitor drugs, is known for treating upper gastrointestinal tract bleeding in severely ill patients.^{7,8} The drug is also used in treating infections from *Helicobacter pylori*, and the treatment of nonsteroidal inflammatory drugs, gastroduodenal ulcer, Zollinger-Ellison syndrome as well as gastroesophageal reflux disease. Overall, such medications are prescribed due to their low side effect incidences coupled by their superior efficacy when compared to other drugs that are normally used in treating similar conditions.⁸ The drug acts to decrease the amount of acid in the stomach.

Omeprazole has a higher success rate when used among patients with functional dyspepsia. The drug works best for patients exhibiting moderate heartburn together with baseline regurgitation. Specifically, omeprazole works well when adopted for a period of four weeks when compared to other drugs, such as ranitidine, cisapride, and placebo. To those patients who do not, or, have minimal heartburn alongside regurgitation at baseline, both ranitidine, as well as omeprazole, are more efficient when compared to placebo.⁸

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Another study suggests that there is a complete experience of symptom relief when omeprazole is used in patient subgroups that depict ulcer-like as well as reflux-like dyspepsia. Contrary to the expectations, omeprazole does not indicate any benefit in patients diagnosed with dysmotility-like dyspepsia.⁹

The prolonged use of any medication is a safety concern, particularly if the drug can easily be accessed over the counter. The Food and Drug Administration recommends the need to consider *C. Difficile*-associated diarrhoea diagnosis if the patients taking PPIs present with a persistent diarrhoea. Such patients should be prescribed the lowest PPI dose for the limited amount of time possible in an effort to improve their condition while under treatment. In its 2008 priority agenda, the American Gastroenterological association provided a management of GERD guideline that suggested a routine PPI monitoring. Nevertheless, various studies have persistently showed evidence of long-term consequences from the use of PPI, comprising of infections as well as malabsorption. As a consequence of prolonged PPI use, the malabsorption influences the levels of magnesium and calcium, while the PPI associated infections include pneumonia as well as *Clostridium difficile*.⁸ Moreover, PPI have been broadly adopted in gastrointestinal disease treatment and have also resulted in the decline of cognition. In a cohort study that involved longitudinal observation data of over 70,000 study subjects, the authors reported that old patients, 75 years and above, who were receiving PPI medication had a significant increase in dementia when compared to their peers who are not receiving PPI treatment.⁷ Additionally, PPI has been linked to other adverse events in the recent past that comprise the clopidogrel (Plavix) resistance, reduced levels of magnesium, which results in elevated leg spasms risks, seizures, arrhythmias, cardiac birth defects when used by a pregnant woman, osteoporotic fractures from persistent use.¹⁰ Similar findings are reflected in a warning issued by the FDA, indicating that omeprazole a PPI has the potential to minimize the antithrombic effect of clopidogrel when the two are concomitantly consumed to almost half. The study noted a drastic reduction in the number of patients that were undergoing combination therapy with one-third still using the combination therapy even after the FDA Safety warning.¹¹

In a majority of hospitals, proton pump inhibitors have been widely utilised as a first-line agent in the prevention and management of a large spectrum of approved conditions. Nevertheless, PPIs are marred by a profile of side effects that can be disregarded in the course of prescribing such agents beyond the Food Drug Administration restrictions.¹² In 2018, a retrospective study of patients admitted to an acute hospital, found that there still exists an irrational PPI prescription both in the hospital as well as in the general practice. The research noted that the drug beneficial outcomes and cost-effectiveness are weighed against their side-effects. Such cost-benefit analysis is highly undertaken in the elderly segment of the population, which is characterised by a greater degree of polypharmacy concerns. The research finding was in a backdrop of the commonest PPI prescription indication that

was associated with the reduction in the gastric ulceration risks that comes about as a result of the NSAID use.¹³

Despite the increasing concerns about proton pump inhibitors, their use has been frequently adopted with available literature. Most of the literature has evaluated the correct versus the wrong PPI use on a global scale. In a study undertaken in a tertiary hospital in China where PPI prescriptions were collected in the hospital from January 2007 for 9 years, the authors found that the PPI prescription rate increased from 20.41 to 37.21%; utilization increased from 132,329 defined daily doses DDDs to 827,747 DDDs, and the expenditure increased from 3.15 million to 25.29 million CNY. The research concluded that the PPI utilization and expenditure growth was as a result of increase in patients as well as PPI irrational use. The research continues to note that the pharmacist interventions assist in reducing the utilization, expenditure as well as improve inpatient rationality.¹⁴

Objective of the Study

Primary

- Analyse the omeprazole prescription habit (frequency) from all the prescriptions received by pharmacists in 1 day.
- Examine the cost of dispensed omeprazole

Secondary

- Investigate the omeprazole prescription habit (frequency) in patients receiving Clopidogrel, as well as those with bone medical conditions.

MATERIALS AND METHODS

Data Sources

The study used data obtained from a pharmacy department. All the prescription orders in the pharmacy undertaken between 7:30 am to 1:45 pm were screened. The study sample consisted of 145 patients who had close to 569 prescriptions during that week. The supply of the prescription was undertaken for not less than 30 days. Data analysis was completed using the Statistical Package for Social Scientists software. Combination therapy were described as patients who, at one particular time, had a PPI prescription filled with an overlap of a minimum of 30 days with prescription of clopidogrel during that period.

RESULTS AND DISCUSSION

The research found that each patient received a supply of 30 capsules of omeprazole prescriptions. There were also supplies of 30 tablets for each patient with a ranitidine prescription. The corresponding price for ranitidine was \$ 0.8 per capsule, while omeprazole cost \$1 per capsule. Further, the research observed that out of the 145 patients, 61.4% were male, and 38.6% were female. From the total 145 patients, 96.6% had diabetes mellitus and hypertension. Only 0.7% of the 145 patients were suffering from a bone condition, visited their healthcare provider for dermatological and ophthalmological purposes, and received clopidogrel as demonstrated in Table 1 and Figure 1. From Table 1, we observe that out of the 145 patients, 61.4% were male,

Table 1: Frequency distribution of the selected variables in this study

Variable	n (%)
Gender	
Male	89 (61.4)
Female	56 (38.6)
Diabetes mellitus	
No	5 (3.4)
Yes	140 (96.6)
Antidiabetic medications	
No	5 (3.4)
Yes	140 (96.6)
Hypertension	
No	5 (3.4)
Yes	140 (96.6)
Antihypertensive medications	
No	5 (3.4)
Yes	140 (96.6)
Bone condition	
No	144 (99.3)
Yes	1 (0.7)
Clopidogrel	
No	144 (99.3)
Yes	1 (0.7)
Derma	
No	144 (99.3)
Yes	1 (0.7)
Ophtha	
No	144 (99.3)
Yes	1 (0.7)

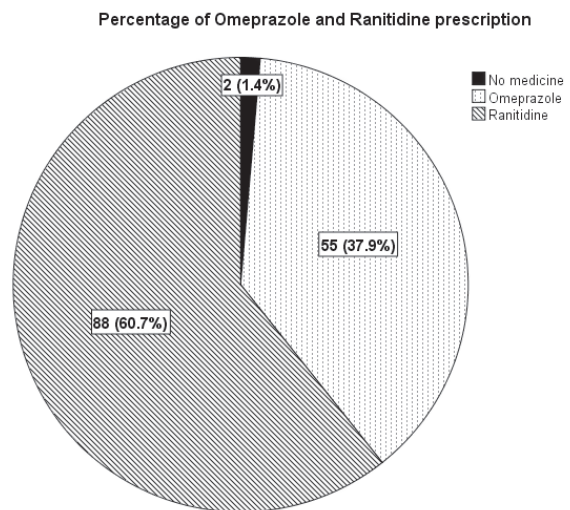


Figure 1: Percentage of omeprazole and ranitidine prescriptions

and 38.6% were female. From the total 145 patients, 96.6% had diabetes mellitus and hypertension. Only 0.7% of the 145 patients had bone condition, derma, and ophtha and received clopidogrel. From Figure 1, we see that out of 145 prescriptions in 37.9% prescriptions, omeprazole was prescribed, whereas 60.7% prescriptions were prescribed for ranitidine. Note that in 1.4% of the total prescriptions, neither omeprazole nor ranitidine were prescribed.

Annual Cost Estimation

We know 145 patients/prescriptions per day and 569 prescriptions per week. Now, the number of prescriptions in one year is $569 \times 52 = 29,588$.

Table 2: Cross table of Omeprazole prescription vs. receiving Clopidogrel and Omeprazole prescription vs. bone medical conditions

	Prescription			Total	P-value
	No medicine	Omeprazole	Ranitidine		
Gender					
Male	0 (0.0%)	36 (40.4%)	53 (59.6%)	89 (100%)	0.201
Female	2 (3.6%)	19 (33.9%)	35 (62.5%)	56 (100%)	
Clopidogrel					
No	2 (1.4%)	54 (37.5%)	88 (61.1%)	144 (100%)	0.393
Yes	0 (0.0%)	1 (100%)	0 (0.0%)	1 (100%)	
Bone condition					
No	2 (1.4%)	54 (37.5%)	88 (61.1%)	144 (100%)	0.393
Yes	0 (0.0%)	1 (100%)	0 (0.0%)	1 (100%)	
Diabetes mellitus					
No	2 (40.0%)	2 (40.0%)	1 (20.0%)	5 (100%)	0.001
Yes	0 (0.0%)	53 (37.9%)	87 (62.1%)	140 (100%)	
Hypertension					
No	2 (40.0%)	2 (40.0%)	1 (20.0%)	5 (100%)	0.001
Yes	0 (0.0%)	53 (37.9%)	87 (62.1%)	140 (100%)	
Dermatological condition					
No	1 (0.7%)	55 (38.2%)	88 (61.1%)	144 (100%)	0.401
Yes	1 (100%)	0 (0.0%)	0 (0.0%)	1 (100%)	
Ophthalmological condition					
No	2 (1.4%)	54 (37.5%)	88 (61.1%)	144 (100%)	0.393
Yes	0 (0.0%)	1 (100%)	0 (0.0%)	1 (100%)	

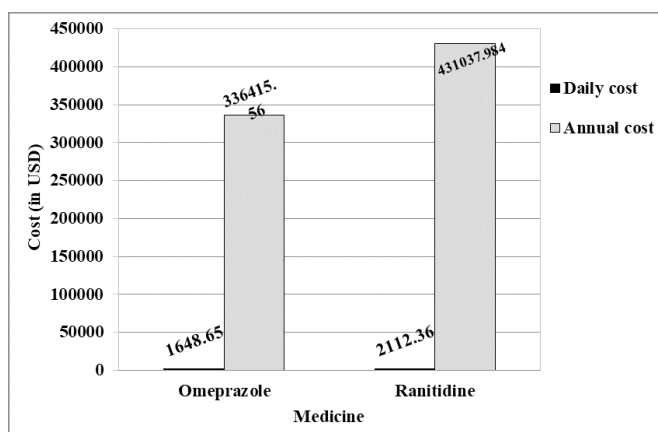


Figure 2: Column graph of daily and annual cost of Omeprazole and Ranitidine

Cost per prescription for Omeprazole 30 USD (30 capsules with 1 USD per capsule) and for Ranitidine 24 USD (30 tablets with 0.8 USD per tablet).

The percentage of Omeprazole prescriptions per day is 37.9% and the percentage of Ranitidine prescriptions per day is 60.7%.

Annual cost for Omeprazole = $29588 \times (\% \text{ Omeprazole prescriptions in 1 day}) \times (\text{cost per Omeprazole prescription})$
 $= 29588 \times (37.9\%) \times 30 \text{ USD}$
 $= (29588 \times 0.379 \times 30) \text{ USD}$
 $= 336415.56 \text{ USD}$

Annual cost for Ranitidine = $29588 \times (\% \text{ Ranitidine prescriptions in 1 day}) \times (\text{cost per Ranitidine prescription})$
 $= 29588 \times (60.7\%) \times 24 \text{ USD}$
 $= (29588 \times 0.607 \times 24) \text{ USD}$
 $= 431037.984 \text{ USD}$

From Table 2, we observed that there was only one patient receiving clopidogrel and omeprazole. We also found that there was only one patient with bone medical conditions who had a prescription of omeprazole. Out of a total of 145 patients, 140 patients had diabetes mellitus and hypertension. 37.9% of the diabetes patients received omeprazole compared to 62.1% who were receiving ranitidine ($P = 0.001$). Also 37.9% of the hypertension patients received omeprazole compared to 62.1% who were receiving ranitidine ($P = 0.001$).

CONCLUSION

The cumulative effect of the cost that amounted to 336,415.56 for omeprazole and 431,037.984 USD for ranitidine is a clear indication of the extent in which the scarce resources are highly required to sustain the respective costs of Omeprazole and Ranitidine. An error in prescription leads to wastage of resources while at the same time necessitates the adoption of medical remedies to suppress the detrimental effects of omeprazole and ranitidine. The overall effect is the increased cost of medication as well as an intense strain to healthcare resources. The combine therapy in the treatment of bone medical condition, on the other hand, cumulates the overall cost. These findings are supported by one research that concludes that the detrimental effect in the use of combined

therapy comprising ranitidine and omeprazole enhances the overall cost. The cost increase is as a result of the interactions of the two drugs necessitating the need for an alternative intervention. A similar opinion is shared by FDA that warns against concomitant use of omeprazole as well as ranitidine.

Despite limited access to prescription system for one day, the result highlighted the problem in the pattern of prescribing omeprazole. There is a further need to seek for increasing commitment of the healthcare provider as well as the patients toward addressing errors in prescription. Few prescriptions with clopidogrel and in bone problems, but this should be further investigated to see the pattern in an extended study duration.

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