



Published in final edited form as:

J Hosp Med. 2014 November ; 9(11): 731–733. doi:10.1002/jhm.2249.

Do hospitalists overuse proton pump inhibitors? Data from a contemporary cohort

Mohammed Albugeay, MD¹, Naimah Alfaraj, MD², Jane Garb, Ms³, Adrienne Seiler, MD^{2,4,6}, and Tara Lagu, MD, MPH^{2,5,6}

¹Medstar Georgetown University Hospital, Washington DC

²Division of General Medicine, Baystate Medical Center, Springfield, MA

³Epidemiology and Statistics group, Baystate Medical Center, Springfield MA

⁴Baycare Health Partners/Pioneer Valley Accountable Care, Springfield, MA

⁵Center for Quality of Care Research, Baystate Medical Center, Springfield, MA

⁶Tufts University School of Medicine, Boston, MA

Introduction

Proton pump inhibitors (PPIs) are commonly used to treat acid-related disorders, but are associated with an increased risk of pneumonia and *Clostridium difficile* associated-diarrhea.^{1,2} Initiation of PPIs in hospitalized patients should therefore be limited to specific clinical situations, such as upper gastrointestinal bleeding or stress ulcer prophylaxis in the critically ill.³ Prior studies suggest significant overuse of PPIs in hospitalized patients exists,^{4–7} but these were published before the widespread implementation of local and national quality improvement efforts targeted at reducing PPI use in medical inpatients (e.g. Society of Hospital Medicine’s (SHM) “Choosing Wisely” list⁸). We aimed to determine the frequency of inappropriate use of PPIs in a contemporary cohort of hospitalized patients in a tertiary care academic medical center.

Methods

We conducted a retrospective cohort study of 297 patients admitted to a tertiary-care center hospitalist service comprised of teaching and non-teaching medical patients who were not critically ill, were admitted between 01/01/2012 and 3/31/12, and received a PPI during their hospital stay. Three internists used American College of Gastroenterology and the American Society for Gastrointestinal Endoscopy and prior studies to develop criteria to identify

Corresponding Author: Mohammed Albugeay, MD, Clinical Fellow, Division of Gastroenterology and Hepatology, MedStar Georgetown University Hospital, 3800 Reservoir Rd, NW, M-2210 Main Hospital, Washington, DC 20007.

The authors have no conflicts of interest.

Drs. Lagu and Albugeay had full access to all of the data in the study. They take responsibility for the integrity of the data and the accuracy of the data analysis. Dr. Lagu, Albugeay, and Seiler conceived of the study. Drs. Albugeay and Al Faraj acquired the data. Dr. Lagu, Albugeay, Al Faraj, Seiler, and Ms. Garb analyzed and interpreted the data. Drs. Albugeay and Lagu drafted the manuscript. Dr. Lagu, Albugeay, Al Faraj, Seiler, and Ms. Garb critically reviewed the manuscript for important intellectual content. Dr. Albugeay is a recipient of a scholarship from the Ministry of Higher Education, Kingdom of Saudi Arabia.

“appropriate” and “inappropriate” PPI use (Table 1).⁴⁻⁷ “Appropriate” indications included gastrointestinal (GI) bleeding, esophagitis, gastritis, gastroesophageal reflux (GERD), and continuation of home PPI (abrupt discontinuation can trigger reflux symptoms).⁹ We extracted the medical records of included patients, applying our prespecified criteria to determine whether use was appropriate. In patients in whom PPI was a continued home medication, we also extracted 2 years of data prior to the index date to determine if the medication was started during a prior hospital admission and, if so, whether this initiation was appropriate. We used descriptive statistics and chi-squared tests to compare patient characteristics and indications for PPI use.

Results

Of 297 patients, mean age was 64.4 years, (SD 16.3), most were white (69%) and 56% were women (Table 2). PPI use was appropriate in 231 (78%, 95% CI 73.0% – 82.5%) patients. Of these, the majority, 172 (74%) patients, received a PPI because it was a continued home medication. Only 40 of the 172 patients had the medication started during a recent hospitalization and in half of these cases (20) the PPI use was appropriate.

The second most common appropriate diagnosis was GERD (31%) followed by history of GI bleeding (19%) and treatment for esophagitis or gastritis (18%). Among the 66 patients receiving a PPI inappropriately, the majority of patients (56%) had no documented reason for PPI use and only 11 patients (17%) were receiving PPI for stress ulcer prophylaxis (Figure-1). Five patients (8%) were treated prophylactically because of steroid or anticoagulant use. We observed no differences in age, gender, race or reason for admission between the patients treated appropriately versus inappropriately.

Discussion

In a contemporary cohort, chronic PPI use prior to admission was the most common reason PPIs were prescribed in the hospital. About 20% of hospitalized patients were started on a PPI for an inappropriate indication, the majority of whom lacked documentation concerning the reason for use. Among patients treated inappropriately, 36% were discharged on acid suppressive therapy.

The prior literature has reported much higher percentages of unnecessary PPI use in hospitalized patients.⁴⁻⁷ Gupta et al., found that 70% of patients admitted to an internal medicine service received acid-suppressive therapy, 73% of whom were treated unnecessarily.⁵ Similarly, Nardino found that 65% of acid-suppressive therapy in hospitalized medical patients was not indicated.⁴ If we had excluded patients on home PPIs from our study cohort, we would have found a higher rate of inappropriate use due to a smaller overall patient population. However, we chose to include these patients because they represented the vast majority of hospitalist-prescribed PPIs. Notably, most of these prior prescriptions were not written during a recent hospital stay, indicating that the majority were initiated by outpatient physicians.

Our study is limited by its small sample size, single-center design, and inability to determine the indications for outpatient PPI use. Still, it has important implications. Prior work has

suggested that focusing efforts on PPI “overuse” may be premature in the absence of valid risk prediction models defining the patient populations that most benefit from PPI therapy.¹⁰ Our work additionally suggests that hospital rates of inappropriate initiation may be relatively low, perhaps because hospitalist culture and practice have been affected by both local and national quality improvement efforts and by evidence dissemination.⁸ Quality improvement efforts focused on reducing inpatient PPI use are likely to reveal diminishing returns, as admitting hospitalists are unlikely to abruptly discontinue PPIs prescribed in the outpatient setting.⁹ Hospitalists should be encouraged to assess and document the need for PPIs during admission, hospitalization, and discharge processes. However, future efforts to reduce PPI overuse among hospitalized patients should predominately be focused on reducing inappropriate chronic PPI use in the outpatient setting.

Acknowledgments

The study was conducted with funding from the Department of Medicine at Baystate Medical Center. Dr. Lagu is supported by the National Heart, Lung, and Blood Institute of the National Institutes of Health under Award Number K01HL114745.

We would like to acknowledge Peter Lindenauer for his comments on an earlier draft of this manuscript.

References

1. Herzig SJ, Vaughn BP, Howell MD, Ngo LH, Marcantonio ER. Acid-suppressive medication use and the risk for nosocomial gastrointestinal tract bleeding. *Arch Intern Med.* 2011; 171(11):991–997.10.1001/archinternmed.2011.14 [PubMed: 21321285]
2. Herzig SJ, Howell MD, Ngo LH, Marcantonio ER. Acid-suppressive medication use and the risk for hospital-acquired pneumonia. *JAMA J Am Med Assoc.* 2009; 301(20):2120–2128.10.1001/jama.2009.722
3. Laine L, Jensen DM. Management of patients with ulcer bleeding. *Am J Gastroenterol.* 2012; 107(3):345–360. quiz 361. 10.1038/ajg.2011.480 [PubMed: 22310222]
4. Nardino RJ, Vender RJ, Herbert PN. Overuse of acid-suppressive therapy in hospitalized patients. *Am J Gastroenterol.* 2000; 95(11):3118–3122.10.1111/j.1572-0241.2000.03259.x [PubMed: 11095327]
5. Gupta R, Garg P, Kottoor R, et al. Overuse of acid suppression therapy in hospitalized patients. *South Med J.* 2010; 103(3):207–211.10.1097/SMJ.0b013e3181ce0e7a [PubMed: 20134378]
6. Reid M, Keniston A, Heller JC, Miller M, Medvedev S, Albert RK. Inappropriate prescribing of proton pump inhibitors in hospitalized patients. *J Hosp Med Off Publ Soc Hosp Med.* 2012; 7(5): 421–425.10.1002/jhm.1901
7. Craig DGN, Thimappa R, Anand V, Sebastian S. Inappropriate utilization of intravenous proton pump inhibitors in hospital practice--a prospective study of the extent of the problem and predictive factors. *QJM Mon J Assoc Physicians.* 2010; 103(5):327–335.10.1093/qjmed/hcq019
8. [Accessed April 11, 2014] Choosing Wisely | Society of Hospital Medicine – Adult Hospital Medicine. Available at: <http://www.choosingwisely.org/doctor-patient-lists/society-of-hospital-medicine-adult-hospital-medicine/>
9. Thomson ABR, Sauve MD, Kassam N, Kamitakahara H. Safety of the long-term use of proton pump inhibitors. *World J Gastroenterol WJG.* 2010; 16(19):2323–2330. [PubMed: 20480516]
10. Herzig SJ, Rothberg MB. Prophylaxis rates for venous thromboembolism and gastrointestinal bleeding in general medical patients: too low or too high? *BMJ.* 2012; 344(may18 1):e3248–e3248.10.1136/bmj.e3248 [PubMed: 22611168]

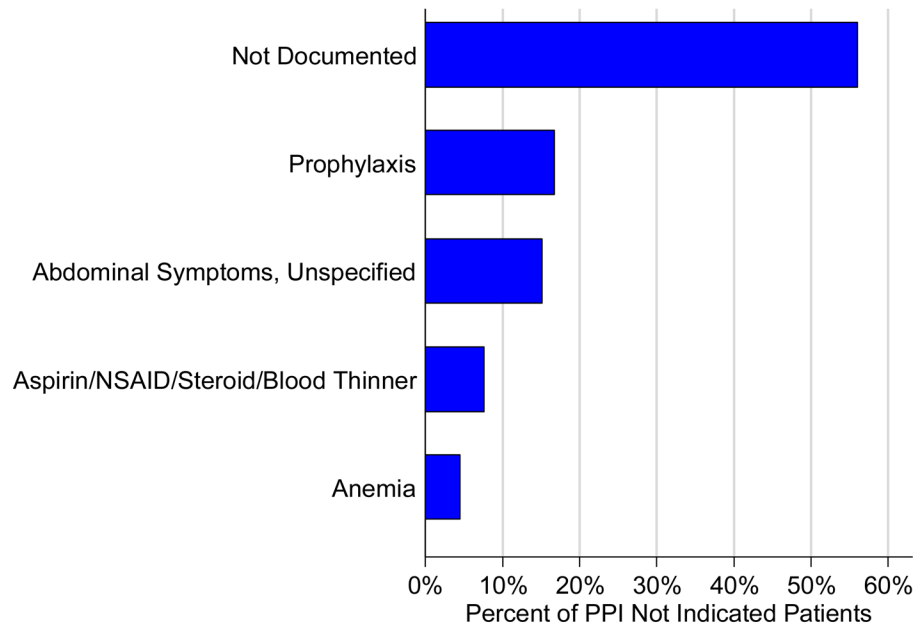


Figure 1.
Reasons for inappropriate PPI prescription

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1

Appropriate and inappropriate PPI uses

Appropriate PPI use	Inappropriate PPI use
History of upper GI bleeding	No reason given
Endoscopic evidence of peptic ulcer disease	Unspecified GI prophylaxis
Esophagitis	Nonspecific abdominal pain
Gastritis and duodenitis	Heartburn (non-chronic)
Eradication of <i>H.pylori</i>	Acute pancreatitis
GERD	Anemia
Barrett's esophagus	Heparin use for DVT prophylaxis
Continued on Home PPI*	Use of aspirin, NSAID, steroids or Coumadin (as a single agent)
Acute esophageal variceal bleeding	
NSAID used in patient >65 years-old	
High risk groups; combination of two or more of (aspirin, NSAID, clopidogrel or Coumadin)	

Developed from guidelines of American College of Gastroenterology, American Society for Gastrointestinal Endoscopy and prior studies^{4,6}
 NSAID = Nonsteroidal anti-inflammatory drugs. GERD= Gastroesophageal reflux disease. DVT= Deep venous thrombosis. *H.pylori*=*Helicobacter pylori*.

Table 2

Baseline Characteristics of Hospitalized Patients with Prescribed PPI

Demographics	PPI Not Indicated (N = 66)			PPI Indicated (N = 231)			Total 297
	Mean	SD	N	Mean	SD	N	
Age	62.5	16.2		64.9	16.3		64.4
	%			%			%
Sex							
Female	51.5%	34		56.7%	131		55.6%
Male	48.5%	32		43.3%	100		44.4%
Race							
Asian	0.0%	0		0.9%	2		0.7%
Black	10.6%	7		9.1%	21		9.4%
Hispanic	18.2%	12		19.5%	45		19.2%
Unknown	0.0%	0		2.2%	5		1.7%
White	71.2%	47		68.4%	158		69.0%
Insurance							
Insured	95.5%	63		87.4%	202		89.2%
Uninsured	0.0%	0		0.9%	2		0.7%
Unknown	4.5%	3		11.7%	27		10.1%
Service							
teaching	25.8%	17		32.9%	76		31.3%
nonteaching	74.2%	49		66.7%	154		68.4%
Unknown	0.0%	0		0.4%	1		0.3%
Chronic Disease							
Cardiac Disease	16.7%	11		13.4%	31		14.1%
Pulmonary Disease	16.7%	11		14.7%	34		15.2%
Gastrointestinal Disease	13.6%	9		45	18.2%		54
Hepatic Disease	7.6%	5		3.9%	9		4.7%
stroke	1.5%	1		5.2%	12		4.4%
sepsis	12.1%	8		13.0%	30		12.8%
other	33.3%	22		29.4%	68		30.3%
PPI Status							
Continued Home PPI	0.0%	0		74.5%	172		58.1%
Started on PPI in Hospital	100%	65		25.5%	59		41.9%
Discharged on AST							
Yes	36.4%	24		89.6%	207		22.2%
PPI	87.5%	21		96.6%	200		95.7%

