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The use of proton pump inhibitors in patients aged 65 years and above in an academic tertiary referral hospital

P. McCluskey[1], M. Hassabo[1], M. T. Zainal[1,2], J. Browne[1,3], O. Ntlholang[1,2].

1. Department of General and Acute Medicine, St. James's Hospital, Dublin 8, Ireland.
2. Discipline of Medical Gerontology, School of Medicine, Trinity College Dublin, College Green, Dublin 2, Ireland.
3. Discipline of Clinical Medicine, School of Medicine, Trinity College Dublin, College Green, Dublin 2, Ireland.

Abstract

Background

Proton Pump inhibitors (PPIs) are among the world's most frequently prescribed medications. PPIs are generally well tolerated though are associated with adverse effects ranging from decreased absorption of concomitant medications to *C. difficile* infection. Due the innocuous perception on PPIs they are prescribed with less scruitany.

To understand PPIs' current prescribing patterns, indications, and durations in patients 65 years and over admitted to general medical teams within our institution.

Methods

A retrospective review of individuals aged ≥65 years under medical teams in an academic tertiary referral hospital over a month to evaluate typical PPI usage encountered, frequency of PPI prescriptions at both admission and discharge, and recorded indications.

Results

Of the 77 individuals included in this study, 59 (77%) were prescribed a PPI at some point during admission. Of the patients surviving to discharge, 98% (n=53) remained on a PPI at discharge. One patient (2%) had a PPI stopped before discharge. Indications for a PPI were explicitly stated in 25% (n=15) of patients prescribed a PPI. A further 27% (n=16) could have an indication derived from information within the electronic health record. One (2%) patient was prescribed a PPI, and a duration was indicated.

Discussion

PPIs lack relevant documentation and may be inappropriately prescribed.

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Introduction

Proton Pump Inhibitors (PPI) have existed for decades, with the introduction of omeprazole in 1989[1]. Since then, four other drugs, esomeprazole, lansoprazole, pantoprazole, and rabeprazole, have been approved and added to the PPI class.

PPIs are used to treat upper gastrointestinal pathology and as prophylaxes with long-term use of other common medications, such as non-steroidal anti-inflammatory drugs (NSAIDs), direct oral anticoagulants (DOAC), and steroids. Due in large part to the frequency of these indications, particularly in older adults, PPIs are among the most prescribed medications in Ireland[2].

In 2021, four of the five PPIs eligible for reimbursement were included on a list of 100 most prescribed medications in Ireland for the year with esomeprazole (4th), pantoprazole (13th), lansoprazole (14th), and omeprazole (23rd) representing a total of 4,614,739 prescriptions, costing the Health Service Executive (HSE) € 27,557,337[3]. These four drugs alone made up approximately 7% of drugs prescribed under the most common community drug payment scheme[3].

In 2005, in a study of a small population of hospitalised patients in Ireland, 70% of patients on a PPI had the PPI initiated in a hospital setting, of which about a third lacked an appropriate indication[4]. Another study observing PPI prescribing in a community setting found that PPIs comprised 20% of all medications prescribed, and 80% of PPIs prescribed were long-term[5]. Furthermore, a recent multinational study found that over half of multi-morbid individuals over the age of 70 with polypharmacy were on PPIs pre-admission, of which only 54% were potentially appropriate[6].

Despite being commonly prescribed and while generally tolerated, PPIs are also known to have a range of potentially significant side effects, particularly when used long-term, as is common in older patients and those on polypharmacy. Some of the more concerning associated side effects of PPI use, mainly if long-term, are gastrointestinal infections (e.g. Clostridium difficile), fractures, electrolyte deficiencies, and possibly pneumonias[7].

This review aimed to understand PPIs' current prescribing patterns, indications, and durations in patients 65 years and over admitted to general medical teams within our institution.

Methods

Our institution's Research and Innovation Office (reference number: 7970 on 22nd February 2024) approved the review before data collection.

This review was conducted in our largest acute academic model 4 hospital in Ireland, based in the south inner city of Dublin. All medical admissions are handled by an on-call team covering a 1:9 24-hour roster. General medical teams cover 7 out of 9 on-call slots on the roster. The other two (2) slots are covered by gastroenterology and respiratory teams. Moreover, the Medicine for the Older Person team admits four (4) patients aged 75 years and older Monday to Thursday and three (3) Friday to Sunday.

An initial screening of patient records from the electronic healthcare record was undertaken to identify patients who met the study inclusion criteria. Inclusion criteria were: 1) being admitted between 25th January 2023 and 22nd February 2023, 2) being admitted under a general medicine team, and 3) being 65 years and over.

Patients who met the inclusion criteria were anonymised. Data extraction included age, sex, usage of PPIs, indication documented for PPIs, duration of PPIs, name and dose of PPIs, if a pharmacist was consulted, and if pharmacy documented indications and/or duration of PPIs were recorded. If an indication was not explicitly documented, a review of chart records including medical histories obtained from previous admissions and previous endoscopy reports was undertaken in an attempt to infer an indication where possible.

The PPI dose was compared with NICE guidelines to determine if it was considered a low, standard, or high dose[8]. If indication was listed, the NICE definition of strength for the relevant indication was used; where no indication was listed or inferable, definitions for GORD were utilised. The data was then analysed and compared to national and international standards of PPI usage in hospitalised adults 65 years and over.

Data was stored on an Excel sheet where descriptive statistics were calculated for background demographic data, including means/standard deviations (SDs) and number/percentages.

Results

A total of 77 patients were found to meet the inclusion criteria. Of these, 42 (54.5%) were male, and 35 (45.5%) female. The population's average (SD) age was 79.3 (±7.9) years (Table 1). Seven (9%) patients were deceased by the review endpoint, five (6%) of whom were on a PPI. In total, 59 (77%) patients were prescribed a PPI during admission. Of individuals taking a PPI, 51 (86%) took a PPI pre-admission, with eight (14%) further individuals being prescribed a PPI later during the admission and continuing to discharge. Only one (2%) patient had a PPI discontinued by the time of discharge (Table 2).

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Table 1: Basic demographic characteristics

Characteristics	**PPI**	**No PPI**	**Total**
Age, mean (SD), years	79.3 (±7.5)	79.4 (±9.3)	79.3 (±7.9)
Sex			
Male, n (%)	32 (54%)	10 (56%)	42 (54.5%)
Female, n (%)	27 (46%)	8 (44%)	35 (45.5%)

PPI- Proton pump inhibitor, SD- standard deviation, n- number, %- percentage

Table 2: PPI Usage and Indications

Characteristics		**N (%)**
PPI	Total study population	77
	No PPI	18 (23%)
	PPI at any time point	59 (77%)
	Pre-admission PPI	*51 (86%)*
	Discharged with PPI	*53 (98%)*
	PPI Started during admission	*8 (14%)*
	PPI Stopped during admission	*1 (2%)*
	Deceased	7 (9%)
Indication Recording		
	Clearly Stated + Derived	31 (53)
	Clearly stated	*15 (25)*
	Derived	*16 (27)*
	Not identifiable	28 (47)
	Appropriate Indications	31 (53)
	Inappropriate Indications	28 (47)
Medical Indication	Total	31
	GI Pathology	10 (32%)
	GORD	*3*
	Hiatus Hernia	*0*
	Barrett's oesophagus	*3*
	Previous UGIB/Ulcer	*3*

Gastritis w/o other indication	*0*
Oesophageal cancer	*1*
Antiplatelet with	7 (23%)
Gastritis and age ≥ 65	5
Concomitant steroid	1
DAPT and age ≥ 75	1
Anticoagulant	12 (39%)
DOAC + gastritis	*2*
DOAC + previous UGIB	*1*
DOAC + antiplatelet	*1*
DOAC + concomitant steroid	*1*
DOAC + age ≥ 75	*5*
Warfarin + age ≥ 75	*1*
Warfarin + antiplatelet	*1*
Other	2 (6%)
High-dose steroid	

PPI- Proton pump inhibitor, GI- Gastrointestinal, GORD- Gastroeosophageal disorder, UGIB- Upper Gastrointestinal bleed, DAPT- Dual antiplatelets

Lansoprazole was the most common PPI, making up 41% (n = 24) of prescriptions, followed by esomeprazole (n = 14, 24%), pantoprazole (n = 12, 20%), and lastly, omeprazole (n = 9, 15%). Most PPIs were prescribed at a standard dose, comprising 41% (n = 24) of prescriptions. High-dose PPIs were encountered in 34% (n = 20) patients, and low dose in 20% (n = 12). In three patients (5%), a PPI was prescribed at a dose that exceeded recommendations.

Of the 59 individuals on a PPI, 15 (25%) had an indication documented, with 16 (27%) further patients having a likely indication that could be reasonable derived from information within their healthcare record. There were 28 (47%) individuals on a PPI who did not have an indication stated nor an indication that could be derived from chart records. In patients where an indication was stated or able to be derived from records, all had appropriate indications. Only one (2%) patient on a PPI had an intended duration of a PPI recorded (Table 2).

In the 59 individuals where an indication was stated or could be derived, concurrent usage of anticoagulants comprised the majority of indications (n = 12, 39%), followed by gastrointestinal pathology (e.g. gastroesophageal reflux disease, gastric ulcers, previous bleeds) (n = 10, 32%), and concurrent usage of antiplatelets (n = 7, 23%). Concurrent usage of higher doses of glucocorticoids was the indication in two (6%) of patients (Table 2).

A review of medications by a clinical pharmacist was evident in 68% (n = 40) patients prescribed a PPI, of whom, there were two (5% of those reviewed, 3% of the total on PPIs) instances where a PPI's indication was recommended to be reviewed by the medical team. No patients in this population had a PPI indication documented on review by a clinical pharmacist.

Discussion

This retrospective chart review of PPI usage in hospitalised patients aged 65 years and over revealed that 77% of patients were prescribed a PPI at any point during admission. This is a higher rate than what was found in some multinational studies, such as a recent study evaluating PPI usage in multi-morbid, polypharmacy adults over 70 years, where 57% were prescribed a PPI at admission in a European multi-national study[6]. While there have been no recent studies identifying the prevalence of PPI usage in hospitalised older adults in an Irish population, there has been a recent study in an Irish nursing home population where 57% of residents were on a PPI[9].

With the increase in the use of electronic healthcare records, there is an increasing emphasis on recordings of the indication, or reason for use, for any prescribed medication in an effort to enhance patient safety and communication between healthcare professionals[10]. Documentation regarding PPI indication in our review was worse than that of another Irish review in 2005, where around 33% of medical patients lacked documentation of the indication for a PPI[4]. However, large studies have shown that documentation of indications for any medication is generally very poor, such as a U.S. study involving four million outpatient prescriptions where only 7.41% of prescriptions included an indication[11]. Though in our review, possibly in part due to patient charts being available as part of an electronic health record, the majority of patients could at least have the indication for PPI easily inferred based on previous records.

Reflecting the prevalence of cardiovascular disease in ageing western populations, it was not particularly surprising to find that the majority of indications for PPIs in this population group was concurrent usage of anticoagulants with direct oral anticoagulants and warfarin given these drugs are associated with increased risk of gastrointestinal bleeds to varying degrees. Few patients in this cohort had documented evidence of previous gastrointestinal

pathology; however, age appeared to be the main risk factor driving the co-administration of a PPI. Likewise, concurrent usage of antiplatelets was also a common indication for PPI usage in this population, though this group also tended to have a history of gastrointestinal pathology. Notedly, however, usage of PPIs themselves have, in some studies, shown and increased association with cardiovascular diseases such as stroke and myocardial infarction[12].

It was unexpected to find that a relative minority of patients had a PPI prescribed primarily for gastrointestinal pathology, given the relative prevalence of disorders such as GORD. However, it may be that some of these indications are less likely to be considered clinically relevant during most medical admissions and are simply not documented.

Lansoprazole made up the majority of prescribed PPIs, which may reflect out-of-date practices as lansoprazole was the preferred PPI for the HSE due to cost and side effect profile until 2019, when pantoprazole became the preferred PPI for many indications[13]. While most PPIs were prescribed at standard doses, there were instances where patients were prescribed doses that exceeded recommendations for their indicated use, as well as cases where patients were prescribed PPIs without an indication or duration recorded. However, even when prescribed at a standard dose, that dose may be inappropriate or excessive for patients' actual needs for symptom control in cases of GOR(D). Despite this, there were two cases where an inappropriately low dose of a PPI was prescribed for prophylaxis of gastrointestinal bleeding and on Duel Antiplatelet Therapy (DAPT), where guidelines suggest the usage of a standard dose[12].

The high rate of pharmacist review of medications, exceeding two-thirds of the review population, is a positive finding as it suggests that the hospital already had mechanisms in place to support safe and appropriate medication use, as seen in two cases where clinical pharmacists flagged a possibly inappropriate PPI prescription to the medical team. However, there was no instance in which a clinical pharmacist listed the indication of a PPI. It is likely that, as the majority of patients had a PPI prescribed pre-admission and that these indications were generally not stated, there was no means by which a clinical pharmacist undertaking medication reconciliation and review can accurately and reliably establish an indication as these are completed through discussion with the patient's usual attended pharmacy and in Ireland indications are not mandatory nor routinely placed on prescriptions.

The information gleaned from this review suggests the need for better adherence to prescribing guidelines and improved documentation practices, such as the routine documentation of indication and duration of prescribed medication not only in the records

of hospital charts but also in communication with community-based doctors and pharmacists to enhance better patient care and potentially reduce polypharmacy and patient safety.

There were several limitations in this review. While the majority of patients 65 years and older were admitted under general medical teams, patients in this demographic are commonly admitted under geriatric teams where comprehensive geriatric assessments are typically undertaken, which emphasise medication deprescribing with tools such as the STOPP/START and STOPP/FRAIL criteria which may increase rates of deprescribing versus what is seen under teams that are not specialist geriatrics[14,15]. Likewise, patients in this demographic may have different rates of PPI usage as well as different frequency of indications under other specialist teams such as Gastroenterology and Cardiology. Furthermore, while a previous study in another Irish hospital found better rates of indication recording where a paper-based chart system was in place, the availability of an electronic health record may lead to higher documentation rates than what may be encountered in mainly other paper-based systems.

Declarations of Conflicts of Interest:
None declared.

Corresponding author:
Patrick McCluskey,
Department of General and Acute Medicine,
St. James's Hospital,
Dublin 8,
Ireland.
E-Mail: McCluskP@tcd.ie

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