Armstrong D, Nakhla N. Non-prescription proton-pump inhibitors for self-treating frequent heartburn: the role of the Canadian pharmacist. Pharmacy Practice 2016 Oct-Dec;14(4):868. doi: 10.18549/PharmPract.2016.04.868

Review

# Non-prescription proton-pump inhibitors for self-treating frequent heartburn: the role of the Canadian pharmacist

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Received (first version): 16-Oct-2016 Accepted: 29-Nov-2016

**ABSTRACT**

Heartburn and acid regurgitation are the cardinal symptoms of gastroesophageal reflux and occur commonly in the Canadian population. Multiple non-prescription treatment options are available for managing these symptoms, including antacids, alginates, histamine-H2 receptor antagonists (H2RAs), and proton-pump inhibitors (PPIs). As a result, pharmacists are ideally positioned to recommend appropriate treatment options based upon an individual's needs and presenting symptoms, prior treatment response, comorbid medical conditions, and other relevant factors. Individuals who experience mild heartburn and/or have symptoms that occur predictably in response to known precipitating factors can manage their symptoms by avoiding known triggers and using on-demand antacids and/or alginates or lower-dose non-prescription H2RAs (e.g. ranitidine 150 mg). For those with moderate symptoms, lifestyle changes, in conjunction with higher-dose non-prescription H2RAs, may be effective. However, for individuals with moderate-to-severe symptoms that occur frequently (i.e. ≥2 days/week), the non-prescription (Schedule II) PPI omeprazole 20 mg should be considered. The pharmacist can provide important support by inquiring about the frequency and severity of symptoms, identifying an appropriate treatment option, and recognizing other potential causes of symptoms, as well as alarm features and atypical symptoms that would necessitate referral to a physician. After recommending an appropriate treatment, the pharmacist can provide instructions for its correct use. Additionally, the pharmacist should inquire about recurrences, respond to questions about adverse events, provide monitoring parameters, and counsel on when referral to a physician is warranted. Pharmacists are an essential resource for individuals experiencing heartburn; they play a crucial role in helping individuals make informed self-care decisions and educating them to ensure that therapy is used in an optimal, safe, and effective manner.

**Keywords:** Community Pharmacy Services; Professional Role; Heartburn; Gastroesophageal Reflux; Proton Pump Inhibitors; Self Care; Canada

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## INTRODUCTION

Heartburn is described as a burning sensation in the retrosternal area, and regurgitation as the perception or flow of refluxed gastric contents into the mouth or hypopharynx.[1] Heartburn and regurgitation are the most common acid reflux-related symptoms reported among Canadians.[2,3] According to the Canadian Digestive Health Foundation, approximately 5 million Canadians experience heartburn and/or acid regurgitation at least once per week.[4] Based on the Rome II criteria for functional gastrointestinal (GI) disorders, nearly 30% of adult respondents to a Canadian survey reported experiencing esophageal disorders, which consisted primarily of heartburn.[5] Respondents who were female and those >75 years of age were more likely to experience GI symptoms than males and younger individuals.[6]

Heartburn and regurgitation have been shown in Canadian studies to negatively impact the individual's quality of life (QOL)[3] and to impair their work productivity.[7] Individuals with frequent, moderately intense heartburn lose nearly 6 hours of work per week due to reduced productivity[7], and more frequently occurring symptoms (i.e. 2 or more times per week) can lead to even greater negative effects.[8] Importantly, individuals generally seek medical care when their symptoms become more severe, more frequent, and have a greater impact on their lives.[9,10]

Due to the high prevalence of heartburn and regurgitation in the Canadian population and the number of non-prescription treatment options that are available[11], individuals experiencing these symptoms commonly seek treatment in the community pharmacy setting. Pharmacists are, therefore, ideally positioned to counsel individuals who wish to self-treat their heartburn, primarily by helping them select the most appropriate treatment option. However, it is important to support pharmacists in this role by providing them with appropriate, targeted clinical information to help them assess, triage, and treat individuals in the pharmacy setting.

In an interview-based study, a group of primarily hospital-based pharmacists reported that they do not feel confident in clinical decision-making, which they attribute to a variety of factors, including feeling removed from the medical hierarchy that is involved with these processes.[12] However, the respondents also reported that as the role of the pharmacist continues to evolve, additional training must be provided to include valuable, clinically based

experience, which can instill the confidence that pharmacists may lack in this area. Between 2007 and 2009, after the proton-pump inhibitor (PPI) omeprazole became available without a prescription, a survey of Canadian pharmacists revealed that they generally favored tighter control of non-prescription omeprazole and 61% did not support the new non-prescription status of omeprazole.[13,14] Among those who were not supportive of the switch, 77% cited the complexity around managing reflux symptoms as the primary reason for their unfavorable view. Other reasons included the potential loss of insurance coverage for PPIs (41%) and the opinion that existing non-prescription treatment options are sufficient for managing reflux symptoms (57%). Pharmacists who were supportive of making omeprazole available without a prescription reported that additional training on initial assessment (64%) and monitoring symptoms during treatment (59%) was necessary.[14]

The majority of current treatment guidelines were developed before some PPIs acquired non-prescription status, so there are limited resources to guide pharmacists in advising patients about self-treating their heartburn.[11] Therefore, the goal of this review is to provide pharmacists with relevant information for identifying individuals who are appropriate for non-prescription treatment of heartburn and regurgitation, with a focus on PPIs.

**Determining an appropriate treatment for managing reflux-related symptoms**

Recently, the World Gastroenterology Organisation (WGO) developed guidelines for the community-based treatment of common GI symptoms, including episodic and frequent heartburn.[15] These guidelines include a treatment algorithm that describes options for various clinical scenarios based on the severity and frequency of symptoms (Figure 1). Additionally, the University of Saskatchewan has developed an assessment checklist to guide pharmacists when they encounter individuals experiencing reflux symptoms.[16] Selection of an appropriate treatment is based primarily on the frequency and intensity of symptoms and the degree to which they impact quality of life and daily functioning. It is, therefore, critical to determine the individual's symptomatic history.[15] When symptoms are severe or frequent enough to impact personal or professional activities, more aggressive interventions or referral to a physician should be considered. In addition, inquiries should be made into the individual's age and medical history, including pregnancy status, comorbid conditions, and concomitant medications that could be causing or exacerbating the symptoms.[9,11,17] Importantly, concomitant use of aspirin or non-steroidal anti-inflammatory drugs may produce symptoms that are similar to those caused by acid reflux[15], and other medications (e.g. calcium antagonists, nitrates, bisphosphonates, corticosteroids, potassium supplements) can predispose patients to reflux and potentially precipitate or exacerbate reflux symptoms.[15,18,19] When assessing symptoms, it is important to consider that reflux-like symptoms may also occur in other GI conditions, such as functional dyspepsia or peptic ulcer disease, but these are distinct conditions with different causes that require different treatment options.[20] Dyspepsia is characterized by pain or discomfort that occurs specifically in the upper abdomen and can be chronic or recurrent in nature.[20] The symptoms of dyspepsia may include heartburn, but a diagnosis of gastroesophageal reflux disease (GERD) is likely more appropriate if heartburn or regurgitation is the predominant symptom.[20] However, it is also important to note that certain GI conditions, such as GERD and

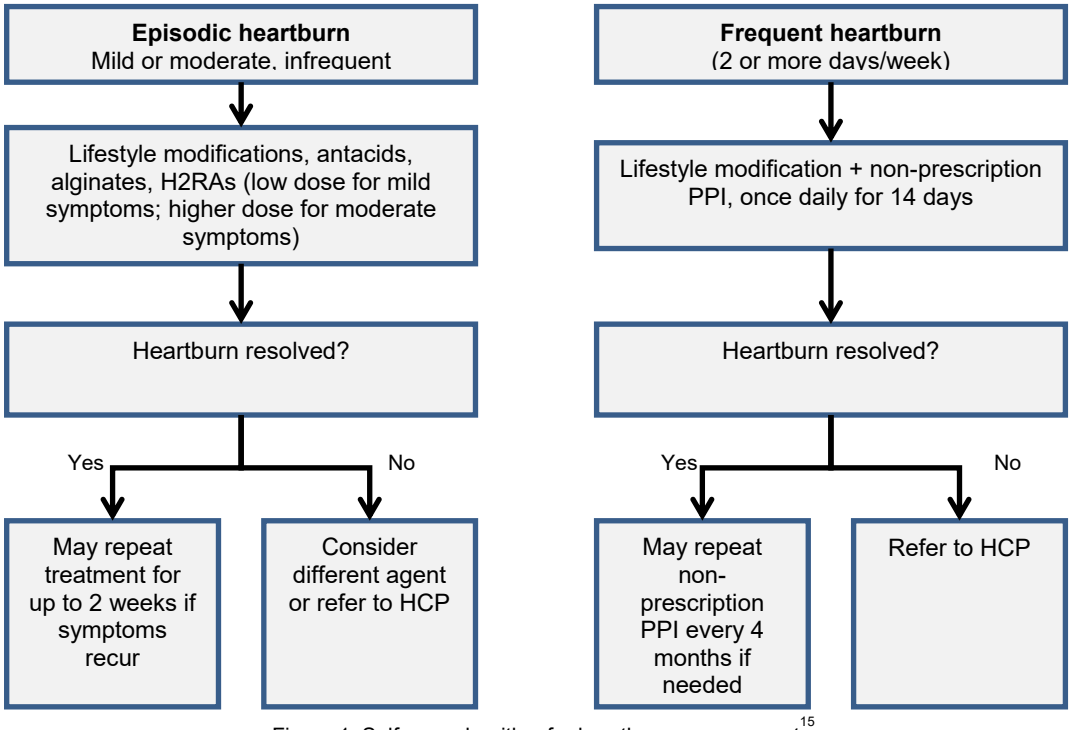


Figure 1. Self-care algorithm for heartburn management[15]
H2RAs= histamine-2 receptor antagonists; HCP= healthcare practitioner; PPI= proton-pump inhibitor

| Table 1. Atypical symptoms and alarm features that require further medical review[3,15,23] |
|---|
| • Vomiting<br>• Gastrointestinal bleeding<br>• Iron deficiency anemia<br>• Involuntary weight loss<br>• Difficult/painful swallowing (dysphagia/odynophagia)<br>• Chest pain<br>• Choking attacks, especially at night<br>• Recurrent cough/hoarseness<br>• Epigastric mass/lymphadenopathy<br>• Family history of esophageal adenocarcinoma<br>• New onset of symptoms >50 years of age |

functional dyspepsia, may co-exist, as both are common and they are not mutually exclusive.[21] Although heartburn and regurgitation are the cardinal symptoms of GERD, the severity and frequency of the symptoms, the degree of impairment in QOL and daily functioning, and the presence of acid-induced esophageal injury are critical factors for determining whether reflux symptoms can be treated in the pharmacy setting or require referral to a physician.[3,15] Importantly, however, the relationship between presenting symptomatic frequency or intensity and the severity of esophageal injury is weak, so even those with less severe symptoms may have or develop esophageal erosions or even Barrett's esophagus.[11,22] The potential for *Helicobacter pylori* infection should also be considered if additional GI symptoms are described; this should prompt a referral to a physician.[15] Heartburn can be self-treated, appropriately, if it occurs intermittently and is characterized by mild to moderate symptoms.[15]

A "safety first" approach should be used when counselling individuals who wish to self-treat their heartburn in the pharmacy setting; this approach, therefore, necessitates an inquiry about the presence of alarm features or atypical symptoms (Table 1).[3,15,23] Individuals with alarm features will require further evaluation by their family physician, who can determine whether a more serious underlying condition may be causing the presenting symptoms and whether a referral to a specialist is necessary.[3,15,23] After reviewing the severity, frequency, and predictability (i.e. known precipitants) of presenting symptoms and medical histories including comorbidities, concomitant medications, and response to previous treatments, pharmacists can help to select the most appropriate treatment option.[17] A step-up strategy is generally recommended for mild or infrequent symptoms; this begins with modalities that act more quickly and then progresses to treatments that have a more prolonged but slower onset of effect for those who do not respond adequately to initial options.[2]

| Table 3. Lifestyle/behavioral modification[15,17,27] |
|---|
| • Maintain a healthy diet<br>• Lose weight, especially in the context of<br>  ○ Recent weight gain<br>  ○ BMI ≥30 kg/m$^2$<br>• Quit smoking<br>• Reduce alcohol consumption<br>• Avoid lying down shortly after eating<br>• Consume smaller and more frequent meals<br>• Avoid restrictive clothing<br>• If nocturnal symptoms are present:<br>  ○ Raise the head of the bed<br>  ○ Avoid eating 2–3 hours before bedtime |
| BMI= body mass index |

In Canada, several non-prescription treatment options are available for self-treating heartburn (Table 2).[17,24-26] The WGO treatment guidelines recommend using non-pharmacologic-based treatments such as lifestyle and behavioral modifications combined with pharmacological treatments such as antacids, alginates, histamine-2 receptor antagonists (H2RAs), and PPIs.[15] Modifying lifestyle and behavioral factors that may cause or exacerbate symptoms is an initial strategy, in particular for those with mild and predictable symptoms, but is also used as an adjunctive therapy for those with more severe symptoms who are receiving pharmacological therapies (Table 3).[15,17,27] While there is limited evidence to support the effectiveness of these interventions, they may provide broader health benefits to the individual and they carry no risk for adverse consequences. These lifestyle modifications include healthy eating and weight reduction (for those with a body mass index >30 kg/m$^2$ or those who have recently gained

Table 2. Non-prescription treatment options available in Canada for relief of heartburn and acid reflux[17,24-26]

| Drug class | Drug name | Brand name | Dosage* |
|---|---|---|---|
| Antacids | Aluminum hydroxide/magnesium with or without simethicone | Various (e.g. Maalox, Diovol) | 10–20 mL as needed (≤80 mL/day) |
| | Calcium carbonate with or without simethicone | | 10–20 mL or 2–4 tablets (≤80 mL/day or ≤16 tablets/day) |
| Antacid-alginates | Alginic acid/ aluminum hydroxide | Gaviscon liquid | 10–20 mL as needed (≤80 mL/day) |
| | Alginic acid/magnesium carbonate | Gaviscon tablets | 2–4 tablets as needed (≤12 tablets/day) |
| H2RAs | Famotidine | Pepcid AC/Complete | 10–20 mg; dose may be repeated up to a maximum of 2 doses/day |
| | Ranitidine | Zantac | 75–150 mg; dose may be repeated up to a maximum of 2 doses/day |
| PPIs | Omeprazole† | Olex | 20 mg once daily for 14 days |

*Products are labelled for administration for no more than 2 weeks, or if symptoms recur/worsen, unless directed by a doctor. †Omeprazole is the only drug listed in this table that is Schedule II; the others are Schedule III or Unscheduled.[37] Drug names are trademarks of their respective owners. H2RAs= histamine-2 receptor antagonists; PPIs= proton-pump inhibitors

Table 4. Questions to identify appropriate candidates for non-prescription PPI therapy[1,3,15-17,23]

| Question | Non-prescription PPI therapy | Referral to physician |
|---|---|---|
| What is the nature of your symptoms? | • Consistent with heartburn/acid reflux definitions:<br>– A retrosternal burning sensation that may rise to the back of the throat<br>– Acidic gastric contents rising into the throat or mouth | • Alarm symptoms (see **Table 1**)<br>• Symptoms related to a non-reflux condition<br>○ Duodenogastric reflux<br>○ Esophageal motor disorders<br>○ Gas reflux |
| How frequently are the symptoms occurring, and when did they start? | • Infrequent, mild or moderate, or frequent (≥2 times/week) | • >3 months, severe or nocturnal heartburn |
| Have you tried lifestyle modifications or medications to improve your symptoms? If so, were they effective? | • May repeat effective treatment for 2 weeks | • Continued symptoms after treatment with heartburn medication for ≥4 weeks |
| Do you have a family history of gastric and/or esophageal cancer? | • No | • Yes |

PPI= proton-pump inhibitor

weight)[28-30], quitting smoking[31], avoiding lying down[32,33], participating in strenuous physical activity after eating[34], raising the head of the bed during sleep (particularly if nocturnal reflux symptoms are present)[32,33] or avoiding restrictive clothing[27], and not avoiding eating for a few hours before bedtime.[27,35] Avoiding known precipitants, including alcohol, coffee, and chocolate, as well as fatty, acidic, or spicy foods, is often recommended; however, because there is limited evidence to support the efficacy of these interventions, the American College of Gastroenterology endorsed only a conditional recommendation for this approach to treating GERD.[21] It is important to note that these lifestyle modifications alone may not alleviate even minor symptoms. In such cases, the addition of non-prescription antacids or alginates or lower- or higher-dose H2RAs for those with mild and moderate symptoms, respectively, are optimal symptom management strategies.[3,17] For individuals experiencing symptoms 2 or more days per week, non-prescription PPI therapy is recommended; however, those experiencing symptoms for >3 months or those who do not respond adequately to 2 weeks of PPI treatment should be referred to a physician.[15]

Heartburn and regurgitation in GERD are caused specifically by a failure or dysfunction of the lower esophageal sphincter, which allows gastric contents to reflux into the esophagus.[2] Therefore, effective pharmacologic heartburn treatments work primarily by reducing exposure of esophageal mucosa to refluxed gastric acid, either by neutralizing the acid, by protecting mucosa from the acid, or by reducing gastric acid secretion (production).[11] Antacids, which can be formulated with or without alginates, provide temporary heartburn relief and, as a result, are most appropriate for individuals experiencing mild, infrequent symptoms.[15,17] Antacids work by neutralizing acid that is refluxed into the esophagus, while alginates provide a foam barrier that neutralizes acid in the stomach and protects esophageal mucosa from refluxed acid.[2] H2RAs block the histamine receptors on the basolateral surface of parietal cells, thereby reducing gastric acid secretion[2,17,36], while PPIs irreversibly block hydrogen pumps in the secretory canaliculi of parietal cells, also to inhibit acid secretion.[2,17,36]

The H2RAs famotidine 10–20 mg and ranitidine 75–150 mg are available without a prescription in Canada for treating frequent heartburn.[25,37] Currently, omeprazole 20 mg/day is the only non-prescription PPI available in Canada, and it is indicated for the management of frequent heartburn (2 or more days/week) for 14 days.[24] However, esomeprazole 20 mg daily is expected to become available without a prescription in the near future. Compared with non-prescription PPIs for treating frequent heartburn, prescription PPIs are generally used at higher doses and for longer periods to treat conditions such as erosive esophagitis and peptic ulcers[24,38]; treating these conditions requires a medical diagnosis and regular follow-up visits with a physician.[39]

PPIs have been shown to be more effective than H2RAs for treating heartburn. In a systematic review of 4- to 8-week clinical trials in patients with non-erosive reflux disease, PPIs were shown to have a greater likelihood of producing heartburn resolution than H2RAs. The risk ratios for heartburn remission were 0.37 [95% confidence interval (CI) 0.32:0.44] and 0.77 [95%CI 0.60:0.99] for PPIs and H2RAs, respectively, versus placebo.[40] Established pharmacologic differences between the PPI and H2RA classes may make them more or less appropriate for a given individual based on the severity and frequency of the presenting symptoms. H2RAs are thought to produce a more rapid onset of effect than PPIs, but H2RAs have a shorter duration of effect. When used for longer treatment periods, H2RAs lead to the development of tolerance or tachyphylaxis, which limits their long-term effectiveness.[17]

### Use of non-prescription PPIs for heartburn and regurgitation

To identify individuals who are appropriate candidates to receive non-prescription PPIs, pharmacists can ask key questions regarding several relevant factors, which are described in Table 4.[1,3,15-17,23] Pharmacists should determine whether the observed symptoms are typical of heartburn, suggestive of complicated GERD or another underlying cause, or are the result of any concomitant medications that the individual may be using.[15,17] Additionally, pharmacists must determine

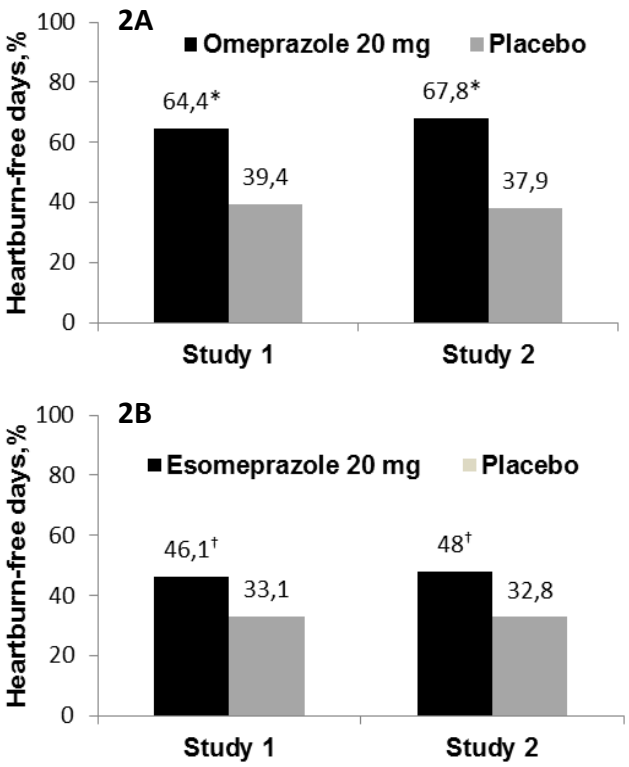


Figure 2. Heartburn-free days in individuals with frequent heartburn treated with A) omeprazole 20 mg for 14 days[47] or B) esomeprazole 20 mg for 14 days[48]
*p<0.001 vs placebo. †p<0.0001 vs placebo.

whether any contraindications related to an underlying medical condition are present that may preclude use of a PPI.[17] If alarm features are present, or if symptoms have not fully responded or recur shortly after a 14-day course of non-prescription PPI treatment, referral to a physician is highly recommended.[11,15] Notably, the overall risk of missing a diagnosis of a more serious condition such as underlying malignancy or esophageal stricture in this population is low, but the potential should never be overlooked.[41] Once non-prescription PPI therapy is initiated, pharmacists have 3 principal responsibilities[41]: confirming that the drug is being used for the correct indication in the appropriate individual by monitoring symptom response, communicating the need to use the drug as indicated by providing clear direction, and communicating factors that indicate the need to consult a physician by clearly identifying what would warrant consultation.

**Additional considerations for using non-prescription PPIs**

All PPIs, in particular omeprazole and esomeprazole, are metabolized to some extent by the hepatic cytochrome P450 3A4 and 2C19 enzyme systems, leading to the possibility of interactions with other drugs metabolized through this pathway (e.g. clopidogrel, diazepam, phenytoin, warfarin).[42] The clinical relevance of these interactions during the short-term use of non-prescription PPI therapy is not clear, but should be considered when initiating non-prescription PPI therapy. As a result, inquiring about concomitant medication is important.

The pharmacokinetics and pharmacodynamics of PPIs have important clinical implications for their short-term use. PPIs are prodrugs that are converted to their active, sulfenamide form in an acidic environment[36], such that they are most effective when the parietal cells are secreting actively and, hence, the secretory canaliculi are acidic. Under these circumstances, the sulfenamide form is trapped in the secretory canaliculi, where it reaches concentrations up to 1000-fold higher than in the blood, leading to irreversible blockade of the proton pump.[43] To ensure that peak PPI concentrations coincide with peak proton pump activity, PPIs should be taken approximately 30 minutes before a meal, preferably breakfast.[17] Over an 8-hour period, the percentage of time with an intragastric pH<4.0 was the effect of 17.2% when a PPI was taken prior to a morning meal versus 42.0% when taken without food.[44] Although some individuals may experience relief within a day of initiating treatment, PPIs generally require repeated dosing to produce maximal acid suppression and therapeutic effects, which occur after approximately 3-5 days of dosing.[24] Individuals should therefore be instructed to take the PPI daily for the entire 14-day treatment course and not use it on an intermittent, as-needed basis, because this regimen is less likely to provide adequate symptom relief.[36]

Esomeprazole, the S-isomer of omeprazole, has somewhat different pharmacokinetic properties from racemic omeprazole.[45] Initial and overall plasma concentrations with esomeprazole 20 mg are higher than with omeprazole 20 mg after administration of a single dose.[46] With repeated administration of both drugs, plasma levels have been shown to increase substantially, which is thought to be the result of a gradual reduction in systemic elimination resulting from decreased first-pass metabolism.[45,46]

Clinical trials have assessed short-term treatment with omeprazole 20 mg and esomeprazole 20 mg for frequent heartburn in individuals who are likely to self-treat these symptoms. Following 14 days of treatment with omeprazole 20 mg, a significantly greater percentage of heartburn-free 24-hour days was observed compared with placebo (Figure 2A; p<0.001 for both studies).[47] In similar trials conducted with esomeprazole 20 mg, on day 14 a significantly greater percentage of heartburn-free days was also observed versus placebo (Figure 2B; p<0.0001 for both studies).[48] Studies that have assessed the effects of PPI treatment, consistent with non-prescription use, on work productivity have not been conducted.

Nocturnal reflux symptoms, which are often related to sleep disturbance, are associated with a significant impact on next-day functioning.[8] Omeprazole 20 mg and esomeprazole 20 mg have both been shown to improve nocturnal symptoms and reflux-related sleep disturbances following 2 weeks of treatment.[49,50] However, individuals who regularly experience nocturnal symptoms may have a more severe manifestation of GERD and may not be appropriate for non-prescription PPI therapy.[15]

**Table 5.** Key pharmacist communication points[15]

- Identify/inquire about the presence of alarm features
- Highlight key lifestyle changes that may help relieve symptoms
- Assess symptom response with the recommended treatment
- Advise individual to
  - Take the recommended treatment continually
  - Complete the entire course of the recommended treatment
  - Consult with a physician if symptoms persist or recur rapidly
- Remind individual that
  - PPIs should be taken 30 minutes before breakfast
  - Antacids can be taken for rapid relief of breakthrough symptoms

PPIs= proton-pump inhibitors

PPIs are generally very well tolerated, particularly when used for short periods. In trials conducted with 20 mg doses of esomeprazole and omeprazole over 14 days for treating frequent heartburn, the most common adverse events, which occurred in 1% to 3% of subjects, were infection, diarrhea, headache, nausea, constipation, abdominal pain, and nasopharyngitis.[47,48] Even though long-term data for standard prescription doses report no major safety concerns during 5 to 12 years of continuous PPI therapy[3,51], there is a suggestion that longer-term PPI treatment is associated with some more serious safety concerns, including a higher prevalence of community-acquired pneumonia, bone fractures, *Clostridium difficile* infection, and vitamin $B_{12}$ deficiencies.[17] Data from observational studies have also suggested a relationship between the use of PPIs and an increased risk for renal disease, myocardial infarction, and dementia.[52-54] The retrospective nature of these studies cannot establish causality, and these effects are generally reported in association with the long-term use of PPIs rather than with short-term, lower-dose PPI therapy. Therefore, the relevance of these reports to the safety of short-term PPI therapy is unclear, but it is expected to be limited. The degree of risk for these safety issues should be assessed on an individual basis, and a determination of the safest and most effective treatment option should be made.

## CONCLUSIONS

Heartburn and regurgitation are the most common acid reflux-related symptoms among Canadians, and many individuals will likely self-diagnose and self-treat these symptoms. PPIs are the most effective short-term treatment for more frequent or severe heartburn. Pharmacists have an opportunity to contribute to the care of individuals experiencing these symptoms by being proactive and knowledgeable about available lifestyle and non-prescription treatment options and considering issues that are necessary to meet the primary goals for treating frequent, troublesome heartburn. Additionally, pharmacists must understand the nature of an individual's presenting symptoms, be knowledgeable of when to refer an individual to a physician (e.g. when alarm features are present or if symptoms do not respond to non-prescription therapy), and educate individuals on the proper use of non-prescription PPIs. Table 5 outlines a list of key communication points that pharmacists should address with individuals seeking to self-treat their heartburn to ensure that these symptoms are treated in the safest and most effective manner.[15]

## CONFLICT OF INTEREST

DA has received grants or personal fees from AbbVie, Allergan, Janssen, Lupin Pharmaceuticals, Olympus, Pendopharm, Pentax, Pfizer, Shire, and Takeda. NN has no conflicts to disclose.

Funding: Medical writing support was provided by Dennis Stancavish of Peloton Advantage, LLC, and was funded by Pfizer Inc.

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