

Appendix 1: Definitions of terms for a study of prescribing appropriateness for proton pump inhibitors

Short-term PPI therapy: Treatment with a PPI for 8 weeks or less.

Long-term PPI therapy: Treatment with a PPI for greater than 8 weeks.

Appropriateness: A PPI order is appropriate if there is a documented and approved indication for use.

- Approved PPI indications include:
 - Documented diagnosis of Barrett esophagus, Zollinger–Ellison syndrome, or refractory erosive severe esophagitis (where prior PPI treatment was completed without symptom resolution)
 - Long-term use (> 30 days) of NSAIDs with one or more of the following bleeding risks: age > 65 years, patient receiving the maximum recommended NSAID dose (or more) for the indication specified,* concurrent use of 2 or more NSAIDs
 - *The following NSAID doses would represent a bleeding risk: diclofenac ≥ 150 mg/day,¹ meloxicam ≥ 15 mg/day,² naproxen ≥ 1000 mg/day, piroxicam ≥ 20 mg/day, ibuprofen ≥ 2400 mg/day,¹⁻³ celecoxib ≥ 800 mg/day¹
 - Concomitant use of systemic corticosteroids, antiplatelet or anticoagulant agents, and/or selective serotonin reuptake inhibitors
 - Severe comorbidity: heart failure, chronic renal and/or hepatic disease, COPD, advanced malignancy
 - History of gastrointestinal bleeding and/or duodenal or gastric ulcers
 - Severe esophagitis or esophagitis with unspecified severity and either painful, frequent symptoms that occur during the day and night,⁴ pain due to complication (esophageal stricture, ulceration), or odynophagia
 - Documented *Helicobacter pylori* colonization or infection, with positive result for one or more of the following: urea breath test, stool samples for *H. pylori* antigens, tissue biopsy with *H. pylori* culture, rapid urease test, or histological findings
 - Refractory GERD (GERD with PPI use for 8–12 weeks or symptoms of GERD following ≥ 8 weeks of PPI use)
 - Prior gastrointestinal bleeding with requirement for long-term anticoagulation

Adverse event: a negative clinical outcome potentially associated with PPI use

- Adverse event criteria include:
 - *Clostridium difficile* infection and/or *C. difficile*–associated diarrhea (positive laboratory findings in stool, cell cytotoxicity assay, or enzyme immunoassay for *C. difficile* toxins A/B and use of PPI preceding the infection)
 - Vitamin B₁₂ deficiency (serum cobalamin < 200 pg/mL plus documented PPI use for ≥ 12 months)
 - Diagnosis of community-acquired pneumonia (documented in patient records; or consistent findings of either sputum sample Gram stain and/or culture positive for *Streptococcus pneumoniae*, *Mycoplasma pneumoniae*, *Haemophilus influenzae*, *Chlamydia pneumoniae*, *Moraxella catarrhalis*, *Legionella* spp., *Escherichia coli*, *Klebsiella* spp., *Enterobacter* spp., *Serratia* spp., or *Pseudomonas aeruginosa*; or chest radiograph or CT scan positive for pulmonary infiltrates; or positive culture results for 2 blood samples drawn at separate times) within 48 h of hospital admission and documented PPI use immediately before admission
 - Bone fractures (including fragility fractures seen in osteoporosis that occur spontaneously following minor trauma to the hip, spine, or wrist) and documented use of PPI for more than 1 year.

PharmaNet: A province-wide network that links all community pharmacies in British Columbia to a central data system. All prescriptions dispensed in community pharmacies in British Columbia are reported to and recorded in PharmaNet.

Abbreviations used in appendix: COPD = chronic obstructive pulmonary disease, CT = computed tomography, GERD = gastrointestinal reflux disease, NSAID = nonsteroidal anti-inflammatory drug, PPI = proton pump inhibitor.

References

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Supplementary material for Wan A, Halpape K, Talkhi SC, Dixon C, Dossa H, Tabamo J, et al. Evaluation of prescribing appropriateness and initiatives to improve prescribing of proton pump inhibitors at Vancouver General Hospital. *Can J Hosp Pharm.* 2018;71(5):308-15.

Appendix 2: Deprescribing card for proton pump inhibitor. © 2016, Vancouver Coastal Health.
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PPIs Treat the Following Approved Indications

Acute Conditions	Recommended Treatment Duration
Endoscopy negative reflux disease	4-8 weeks
Reflux (erosive) esophagitis	8 weeks
Functional (non-ulcer dyspepsia)	2-8 weeks
Helicobacter pylori eradication for peptic ulcer disease (duodenal ulcer recurrence)	≤2 weeks
Helicobacter pylori eradication for peptic ulcer disease (gastric ulcer recurrence)	4-8 weeks

Chronic Conditions:

- Refractory GERD
- Erosive esophagitis
- Zollinger-Ellison syndrome
- NSAID-induced ulcers
- Chronic anticoagulation after a GI bleed
- Barrett’s esophagus

**There is no evidence to support the use of PPIs for primary prevention of antiplatelet-associated peptic ulcers*

PPI Taper Strategies: First Reduction

Current Daily Dose	Tapering Daily Dose Reduction
Dexlansoprazole 60 mg	30 mg
Pantoprazole 40 mg	20 mg
Esomeprazole 40 mg	20 mg
Lansoprazole 30 mg	15 mg
Rabeprazole 20 mg	10 mg
Omeprazole 20 mg	20mg every other day

PPI Tapering Strategies: Second Reduction

(1) Decrease the frequency of PPI use from once daily to once every other day or (2) from every other day to every 3 days or discontinue PPI therapy altogether

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Appendix 3 (Part 1 of 2): Patient counselling sheet for proton pump inhibitor. © 2016, Vancouver Coastal Health. Reproduced by permission.

Proton Pump Inhibitors Discontinuation Information

What is a proton pump inhibitor (PPI) and what is it used for?

A proton pump inhibitor is a medication used to reduce stomach acid production and prevent heartburn.

What are examples of PPIs?

Generic Name	Brand Name
Esomeprazole	Nexium
Lansoprazole	Prevacid
Dexlansoprazole	Dexilant
Omeprazole	Losec
Pantoprazole	Pantoloc, Tecta
Rabeprazole	Pariet

Why do we stop medications?

Your doctor may decide to stop a medication if:

- You are no longer experiencing symptoms
- The risk of harm (potential side effects) outweighs the benefits (symptom control)
- To reduce the number of pills you take
- To reduce the risk of interactions among the medications you are taking

What should I expect when my doctor stops this medication?

If your doctor tells you to stop taking your PPI medication, he or she may decide to taper its use. For example: the dose may be reduced, or your doctor may change how often you are to take this medication (from once daily, to once every other day). This approach is used to reduce the risk of rebound acid production.

In most cases, patients are able to discontinue this medication successfully. However, if you experience any of the following symptoms during this process, please refer back to your doctor:

- Chest pain
- Difficulty or pain when swallowing
- Shortness of breath, coughing, hoarseness
- Worsening heart burn over 2 weeks despite the use of over the counter medications
- Vomiting blood, having black tarry stools
- Unintentional weight loss

Appendix 3 (Part 2 of 2): Patient counselling sheet for proton pump inhibitor. © 2016, Vancouver Coastal Health. Reproduced by permission.

What are some non-drug measures to manage heartburn?

Diet	<ul style="list-style-type: none">• Changing your diet to limit chocolate, caffeine, alcohol, acidic citrus juices, large fatty meals• Eating smaller/more frequent meals throughout the day• Avoid lying down immediately after eating• Avoid meals 2–3 hours before bedtime
Lifestyle	<ul style="list-style-type: none">• Smoking cessation• Stress reduction• Weight loss• Sleep: elevate the head of the bed by 10-20 cm to reduce night-time heartburn
Self-medication	<ul style="list-style-type: none">• Limit self-medication with over the counter products to 14 days at a time, no more than 3 courses per year<ul style="list-style-type: none">• For example: Olex (omeprazole), Pepcid (famotidine), Zantac (ranitidine)

Helpful reminder: Always notify your doctor and pharmacist when starting a new medication or natural health product. This will ensure that these drugs are safe to take with your current medications.