# **Appropriate Use of Proton Pump Inhibitors**

Proton pump inhibitors (PPI) are among the most widely used class of medications for the prevention of gastric ulceration due to their safety profile. However, recent data suggest that the use of PPI is associated with increased risk of vitamin and mineral malabsorption, bone fractures, chronic kidney disease, pneumonia, viral gastroenteritis, and *Clostridioides difficile* infections.1-7 Because of emerging data on the potential harms associated with PPI and the frequent inappropriate use of these agents, careful review of the indications for PPI use should be performed.

The risks of upper gastrointestinal bleed (UGIB) in hospitalized patients are associated with 4 factors: acute illnesses, chronic conditions, drugs, and devices.8

PPI’s are indicated for the **treatment** of the following conditions:

* Zollinger-Ellison Syndrome
* Barrett’s esophagus
* Acute upper GI bleed
* Erosive esophagitis
* *Helicobacter pylori* treatment
* Gastric or duodenal ulcer
* Gastroesophageal reflux disease (GERD)

PPI’s are considered appropriate for the **prophylaxis** of UGIB in the following conditions:9-11

* Mechanical ventilation for greater than 48 hours
* Coagulopathy defined as platelet count <50,000/μL, INR >1.5, or PTT 2x control
* Traumatic head injuries with a [Glasgow Coma Score](https://www.mdcalc.com/glasgow-coma-scale-score-gcs) ≤10 or inability to follow simple commands
* Burns affecting >35% of total body surface area
* Major trauma with an [Injury Severity Score](https://www.mdcalc.com/injury-severity-score-iss) ≥16
* Spinal cord injury
* Partial hepatectomy
* Solid organ transplantation perioperatively in the ICU setting
* Antiplatelet therapy (usually aspirin + clopidogrel, prasugrel, or ticagrelor) in patients at high risk for GI bleeding (prior history of GI bleeding; age >60 years; concurrent use of anticoagulants, corticosteroids, or NSAID; *Helicobacter pylori* infection)
* Long-term NSAID use in patients with moderate to high risk of GI bleeding
  + Moderate risk is defined as 1 or 2 of the following risks: age >65 years; [high dose NSAID](https://www.ncbi.nlm.nih.gov/books/NBK65641/) therapy (ibuprofen >2400 mg daily, naproxen >1000 mg daily, meloxicam >7.5 mg daily); previous history of uncomplicated ulcer; concurrent use of aspirin, corticosteroids, or anticoagulants)
  + High risk is defined as history of complicated ulcer especially recent, or >2 risk factors outlined in the moderate risk group
* Any 2 of the following
  + Sepsis
  + ICU stay > 7 days
  + Occult bleeding lasting more than 6 days
  + High dose corticosteroids (> 250 mg/day of hydrocortisone, >50 mg/day of methylprednisolone, >60 mg/day of prednisone, >10 mg/day of dexamethasone)

Patients started on a PPI for prophylaxis of any of the conditions above should not have them continued upon discharge unless a chronic condition exists that requires their use.

Besides reviewing the indication of PPI use for appropriateness, the dose and duration of therapy should also be evaluated. As with all medications, the lowest possible dose and shortest duration of therapy should be employed. When the inciting factor (e.g., removal of the hypersecretory tumor in Zollinger-Ellison Syndrome or discontinuation of chronic NSAID) is no longer present, discontinuation of PPI should be considered.

Acid suppression and especially PPI’s are associated with increased risk of C. difficile infection (CDI) relapse.7,13 CDI patients should have PPI use evaluated closely and the agent discontinued if medically possible. If acid suppression is still necessary, consider changing to an H2-blocking agent if medically appropriate.

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