



REVIEW ON EFFECTIVE USE OF PROTON PUMP INHIBITORS IN CLINICAL PRACTICE

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Abstract

Proton pump inhibitors (PPIs), which are powerful inhibitors of gastric acid secretion, are invaluable in the treatment of acid-related disorders but their extensive and sometimes prolonged use creates concerns about patient safety and the utilization of healthcare resources. This review integrates current evidence and guidelines to overcome the problems with inappropriate use of PPIs. It emphasizes the need for patient-related strategies, such as careful clinical evaluation and compliance with evidence-based guidelines, to best optimize PPI therapy. Strategies like deprescribing protocols, patient education, and prescription audits are brought to the advance to counteract the risks of long-term PPI use. In addition, the need to create and execute context-specific guidelines, along with concerted efforts by healthcare teams, is emphasized to promote judicious use of PPIs and enhance patient outcomes.

Key words: Proton Pump Inhibitors (PPIs), Inappropriate Use of PPIs, Deprescribing, Acid-Related Disorders, Clinical Guidelines, Long-Term PPI Use.

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Introduction

The medication for acid-related issues like GERD, ulcers, and Zollinger-Ellison syndrome are proton pump inhibitors, or PPIs [1]. They work wonders by hitting the brakes on the H⁺/K⁺-ATPase enzyme, that little engine in your stomach's parietal cells, and drastically cutting down on acid production [2]. Now, they're undeniably effective, but that popularity means we've got to be smart about how we use them. We need to nail the right conditions, get the dose spot-on, and keep an eye on how long someone's on them to get the best and avoid the bad stuff [3]. It's a bit of a tightrope walk for doctors, weighing the benefits against the potential drawback of long-term use, like a higher chance of infections, nutrient deficiencies like B12 and magnesium and how they might mess with other medications [4]. Making an accurate diagnosis is essential, which entails learning more about the patient's history, examining their symptoms, and, if necessary, performing an endoscopy to determine the true cause [5]. Additionally, we should think about reducing the dosage of

PPIs for members of the community who have been taking them for a long time and no longer require them, which means gradually lowering the dose and keeping a close watch to make sure those old symptoms don't sneak back [6, 7]. Basically, getting PPI therapy right is about looking at the whole person, sticking to the best advice out there, and always checking to see how well the treatment's working and how safe it is [8].

The frequency with which people are blowing up proton pump inhibitors is a real problem. They certainly help with some gastrointestinal issues, but things have gotten out of control. Many communities are on them without a solid reason, or they're staying on them way longer than they should [9]. This isn't just a waste of money it's putting people at risk for nasty infections like clostridium difficile, interfering with their nutrients, and potentially causing trouble with other medications they are taking [10].

The right way to handle PPIs It's all about treating the person, not just the symptoms. Doctors need to really listen to the patient's story, figure out exactly what's going on, and get a look inside with an endoscopy when it's necessary [11]. We need to stick to the proven guidelines, think about each patient's individual health, and keep an eye on how well the medication is working and if it's causing any problems [12]. For those who have been on PPIs for ages, we need to think about gradually removing them off, slowly lowering the dose and making sure those

old symptoms will not recurrent [6]. And we need to educate everyone doctors and patients alike and create awareness about when to start PPIs and how long to take them. That's the better and safe way for effective use of PPIs [13].

PPIs have been a game-changer when it comes to overcoming stomach acid problems. They have become a basic in how we treat things like ulcers, GERD, and that severe erosive esophagitis [14]. This massive reduction in acid is what lets those damaged areas heal and keeps them from flaring up again and for those rare cases like Zollinger-Ellison, where tumors are causing an acid flood, PPIs are absolutely essential [15]. By soothing that acid, they give patients some much-needed relief and help them live a better life [16]. PPIs also stop a whole bunch of complications eventually, like internal bleeding, those tight spots in the esophagus, and even Barrett's esophagus [17]. In really sick patients, they are often used as a preventative measure to stop stress ulcers, which can be a huge problem [18]. Plus, anyone on strong pain medications like NSAIDs or anticoagulants They are often put on PPIs to protect their stomachs from ulcers and bleeding, which those other drugs can cause [19]. So, they're not just a treatment; they're a shield. We have heard the worries about long-term use, but for short-term fixes and managing ongoing problems, PPIs are still crucial. Doctors just need to be smart about it, weighing the good against the bad and making sure the treatment fits the patient's specific needs and the best advice out there [20]. Getting the right patient on the right dose, and checking back regularly to see if they still need it, is important. Of course, telling patients about the medication and keeping an eye on them is what ensures PPIs stay a useful tool in our medical arsenal [21].

Table 01: Summary of Guideline Recommendations for Appropriate Use and Deprescribing of PPIs

S. No	NAME	RECOMMENDATIONS	COMMENTS
1.	American College of Gastroenterology (ACG)	Don't keep people on PPIs if they don't really need them long-term.	Look at each patient's situation, try lifestyle changes first, and slowly lower the dose if you're taking them off.
2.	Choosing Wisely Canada (CWC)	Avoid long-term PPIs unless absolutely necessary.	Really think twice before putting someone on PPIs for a long time, and involve the patient in the decision to stop them.
3.	National Institute for Health and Care Excellence (NICE, UK)	Stop PPIs if symptoms don't come back after a few weeks.	Doctor need to check in with patients regularly, you know, see if they still actually <i>need</i> those stomach medications. It's about making sure nobody's stuck on PPIs longer than necessary.
4.	European Society of Gastroenterology (ESG)	Use a gradual step-down approach to avoid acid rebound.	Taking someone off those stomach acid medications, they might get some rebound heartburn, so keep an eye out for that. And should consider other options like H2 blockers, that could work just as well.
5.	Australian Deprescribing Guidelines	Taper the PPI dose slowly over a few weeks.	It's really important to show community how to cut back on their stomach medications safely, step by step. And, we need to teach them how to switch to just taking those pills when they <i>really</i> need them, not just every day.
6.	American Geriatrics Society (AGS) Beers Criteria	Older adults should generally avoid long-term PPIs unless absolutely necessary.	Be extra careful with PPIs in geriatrics patients due to increased risks and complications.
7.	Canadian Deprescribing Network (CaDeN)	Stop PPIs in mild to moderate GERD if symptoms aren't ongoing.	Encourage lifestyle modifications and dietary changes as the first line therapy for GERD.

American College of Gastroenterology (ACG)

According to the American College of Gastroenterology, don't just leave people on those stomach acid pills (PPIs) if they don't really need them long-term. Now a day when the patient just got a bit of heartburn, or they were on pain medications for a short time, or they're done with that H. pylori treatment, they should probably come off them. The ACG suggests a "step-down" approach, i.e.: taper the dose gradually reduces over time often as the patient condition improves. They should also consider at each person's situation individually, weighing the risks and benefits, and the counselor should counsel patient regarding patient specific life style modifications, dietary changes and exercise that are specific to the age group.

Choosing Wisely Canada (CWC)

We are seeing more groups of patients on proton pump inhibitors (PPIs) for extended periods. According to Choosing Wisely Canada (CWC) It's not just about throwing medications at problems it's about weighing the risks and benefits. This guideline suggests that there should be a interaction between patient and physician before initiation of long-term PPIs therapy, and definitely before cassation of therapy. We are starting to see more evidence of potential complications with prolonged PPI use things like infections, vitamin deficiencies. Eventually it comes down to being cautious about how we use these medications. We need to take care about lifestyle

modifications, switching to other treatment options, before initiating straight to long-term PPIs.

National Institute for Health and Care Excellence (NICE, UK)

Regarding proton pump inhibitor (PPI) management, the National Institute for Health and Care Excellence (NICE) in the United Kingdom recommends a strategy centered on symptom resolution. Specifically, discontinuation of PPI therapy is advised if symptoms do not reappear following a brief treatment period, thereby prioritizing symptom driven intervention over sustained prescription. Furthermore, NICE advocates for routine patient evaluations to determine the ongoing necessity of PPIs, facilitating a systematic approach to deprescribing. This emphasis on timely cessation and periodic reassessment is intended to curtail prolonged PPI exposure, reduce the potential for associated adverse reactions, and optimize healthcare resource allocation by ensuring that PPIs are administered exclusively when clinically indicated.

European Society of Gastroenterology (ESG)

ESG provides a calibrated approach toward the termination of PPI therapy. As a result, the reduction in dose is considered to be the most efficient choice to minimize the chance of acid rebound, which is characterized by reversible higher gastric acid secretion after immediate discontinuation. Such an approach takes into account the probability of symptom worsening during the withdrawal and requires constant monitoring over the patient. Moreover, an alternative pharmacologic treatment is advised by the ESG to be evaluated. For example, taking H₂ receptor antagonists may have the same resultant effect in particular clinical situations. The purpose of the ESG is to ensure a patient-tailored strategy for the management of acid-related disorders, which would also help reduce the dependency on the prolonged use of PPIs.

Australian Deprescribing Guidelines

Australasian Deprescribing Guidelines underscore patient-centered approach to PPI cessation, encouraging a stepwise dose reduction over a few weeks to minimize discontinuation symptoms and ensure patient comfort. The strategy stresses the need for structured weaning regimens to prevent any potential consequent effects. Moreover, they stress the importance of comprehensive patient education in a community setting, focusing on safe dose-decreasing strategies and maximizing the transition to on-demand PPI use in place of lifelong everyday administration. The approach aims to equip patients with the tools to manage acid-related symptoms effectively and improve the quality of medication use and patient outcomes by reducing PPI exposure and its consequent adverse effects.

American Geriatrics Society (AGS) Beers Criteria

American Geriatrics Society Beers Criteria suggests the avoidance of long-term proton pump inhibitor (PPI) usage

in the elderly, suggesting that they should only be prescribed in cases of clear clinical need. This is due to the increased susceptibility of the elderly population to the side effects and complications associated with PPI use, with the potential for them to be more pronounced in this demographic. The Beers Criteria highlights the importance of a careful evaluation of the risks and benefits of PPI therapy among older adults before continuing or initiating treatment, when possible using an alternative approach and adopting a cautious attitude towards avoiding harm in this risk group.

Canadian Deprescribing Network (CaDeN)

Canadian Deprescribing Network (CaDeN) advocates for a judicious application of proton pump inhibitors (PPIs), specifically recommending the cessation of these medications in patients exhibiting mild to moderate gastroesophageal reflux disease (GERD) when symptomatic presentations are not sustained. This methodology emphasizes a therapeutic strategy centered on symptom resolution, thereby discouraging the prolonged administration of PPIs for transient medical conditions.

The Burden of Potentially Inappropriate Use of PPIs

It is essential to address the considerable burden of inappropriate proton pump inhibitors (PPIs) use in clinical practice. The overuse contributes to the large financial burden on the health care system, increases the risk of adverse drug reactions, and can lead to severe consequences. Studies showed the high prevalence of PPIs use inappropriately. Indeed, many patients are taking them more than the recommended duration or for an unapproved indication. It exacerbates health care costs due to prolonged prescriptions and the management of the adverse effects. Furthermore, the availability of over-the-counter PPIs leads to self-medication, which similarly worsens the problem [22].

Long-term PPI treatment can lead to serious adverse drug reactions and various problems. Although generally well tolerated for a short-term treatment, prolonging its application can lead to different adverse effects including the increased risk of infections, nutrient deficiencies (such as vitamin B12, magnesium), as well as more serious diseases such as kidney disease and fractures. Consequently, the risks it leads to explain the necessity of judicious prescribing of the drugs and the need of regular reassessment of the need of their application. Additionally, the occurrence of these diseases does not only affect the patient's health but also has a significant cost for the healthcare services [23].

PPI overuse can be controlled by effective patient counseling. Healthcare providers must design educational programs to teach patients about when to use PPIs, how long to use the medicine, and the risks involved in PPI therapy. The education must also include lifestyle strategies and alternative approaches to treatment that reduce the need for long term use of PPIs. Moreover, there

should be regular reviews of PPI prescriptions to identify situations where the drugs can be reduced or stopped. Deprescribing is a protocol intended to address these issues and thus reduce PPI burden in the health sector and increase patient safety [24].

Consequences of Irrational Use of PPIs

Using proton pump inhibitors (PPIs) irrationally is fraught with implications that go beyond financial consequences. There is a danger of increased risk of many negative health outcomes because of the extensive and inappropriate PPI therapy. In particular, there are data on a positive relationship between long-term PPI therapy and the risk of infections, such as *Clostridium difficile* infection and pneumonia. In addition, there is evidence that PPI therapy leads to the development of nutrient deficiencies, especially in vitamins B12 and Mg²⁺ associated with a change in the acidity of the stomach. This leads to a decrease in the quality of life of the patient and leads to a significant burden on healthcare services [25].

Beyond the infectious and nutritional risks, irrational PPI use is associated with more severe complications. Research suggests a potential connection between prolonged PPI use and an increased risk of renal diseases, such as chronic kidney disease. Additionally, PPI use has been associated with an increased risk of bone fractures, particularly in elderly populations [24]. Repercussions due to irrational PPI use are not restricted only to economic burdens on healthcare systems. The unwarranted continuation of PPI therapy leads to increased healthcare costs and is seen in prolonged prescriptions and the management of PPI-related adverse events. Furthermore, the availability of over-the-counter PPIs promotes self-medication, reinforcing the situation. Therefore, to prevent the consequences of irrational PPI use and improve patient outcomes, it is crucial to implement such strategies as patient education, regular prescription review, and deprescribing protocols [26].

Discussion

Discussions on the effective use of PPIs must address deprescribing protocols importance. Deprescribing is the planned and supervised process of dose reduction or discontinuation of medications, aiming to minimize polypharmacy and prevent adverse drug events. Because the long-term use of PPIs can result in adverse effects, deprescribing protocols have to be implemented. These protocols usually entail a gradual tapering of PPI dosage and close follow-up of symptom recurrence. [9] Educational interventions for healthcare providers and patients are also essential elements of effective deprescribing strategies, ensuring that PPIs are used judiciously and discontinued when it is appropriate [27, 28].

It is also important to discuss the necessity of implementing the programs of patient education and involvement in the management of PPIs. Providing information about appropriate PPIs use, including all of its

potential benefits or risks, may lead to the shared decision-making and the improved adherence to deprescribing recommendations. Educating the patients about lifestyle modification and alternative treatments can decrease the consumption of long-term PPI therapy. Additionally, promoting the ongoing interaction between patients and healthcare providers can ensure the systematic evaluation of symptom control limits, resulting in the needed changes to PPI therapy which further optimizes the clinical outcomes and reduces the adverse consequences of inappropriate PPIs use [27].

Prescription Audit

Role of Prescription Audits in Addressing the Inappropriate Use of Proton Pump Inhibitors

Prescription audits are key to addressing the wide issue of the inappropriate use of proton pump inhibitors (PPIs). These audits are the systematic review of patient records to assess the appropriateness of the PPI prescription, including the indication, dose, and duration of therapy. By identifying the instances of overuse or inappropriate prescribing, an audit can not only show the areas that need improvement but also guide the interventions for optimizing PPI use.

For instance, the audits can reveal the patterns of the long PPI usage without the proper indication or the instances when patients are still on PPIs even after their symptoms are gone. The implementation of the routine prescription audits in the healthcare settings can help to develop the targeted strategies for the appropriate PPI use promotion [29].

Guidelines Development and implementation

Guidelines development and implementation play a crucial role in advancing effective use of proton pump inhibitors (PPIs) in clinical practice. Guidelines should be evidence based, developed from a systematic literature review, expert consensus, and local evidence. They should also clearly indicate the appropriate indications for PPI use, the recommended dosages, and duration of therapy. The guidelines should also discuss the methods of deprescribing PPIs when clinically indicated, recommended gradual tapering, or other strategies to mitigate acid rebound and other symptoms. Given that PPIs are often overused in clinical practice, implementation of these guidelines will require a multifaceted approach, including educational outreach and incorporation into electronic health records. [9]. There is always something getting in the way doctors might not even know the rules exist, they're exhausted, or the patient just absolutely disagrees with the plan. To implement these guidelines, the involvement of whole healthcare professionals is necessary. Conducting of conferences, seminars and training programs related to the implementation of exciting and updated guidelines are necessary. Thorough meeting should be conducted for the implementation of updated guidelines and interaction

with the patient should be concern for their choice of interest and improve quality of life of patient [29].

Conclusion

Proton pump inhibitors, or PPIs, are important for managing stomach acid issues. However, they are often given out too freely by over the counter [OTC], and that's causing real problems with patient well-being and healthcare expenses. To use these medications appropriately, we need a patient first approach, and we must stick to standard, evidence based guidelines. Health care professionals need to conduct detailed patient screening that includes thorough examine of chief complaints, past medical histories and, when necessary, conduction of diagnostic procedures like endoscopies, to ensure proper diagnosis and ensure targeted therapies. Implementing plans to step down therapy or stop PPI use, like carefully tapering of dosages and closely evaluation symptoms, is vital to minimize the risks associated with long-term use. Additionally, medical teams should actively participate in ongoing education and training programs. Regular prescription audit should be done to identify and correct inappropriate PPI usage, ultimately improving patient outcomes.

The updated guidelines should be implemented by health care professionals' clear recommendations for initiation, dosing, continuing and termination of PPI use. A collaborative approach involving all health care professionals are necessary for successful guideline implementation.

Author Contributions

All authors are contributed equally

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Declaration of Competing Interest

The Authors have no Conflicts of Interest to Declare.

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