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Review Article

Beyond Knowledge: Clinical Inertia and De-Prescribing Barriers in Proton Pump Inhibitor Therapy

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Abstract

Inappropriate long-term use of Proton Pump Inhibitors (PPIs) is a public health challenge. It is uncertain if this "implementation gap" is driven by knowledge deficits or other behavioural barriers. This study aimed to quantify systematic de-prescribing protocol (SDP) use and identify barriers to PPI de-prescribing among Internal Medicine (IM) and Gastroenterology (GI) physicians. A cross-sectional survey was conducted among 310 physicians (IM, GI) from three Indian states. A validated questionnaire assessed knowledge, self-efficacy, barriers, and use of an SDP (the primary outcome). A multivariable logistic regression model, robust for clustering, identified predictors of SDP use. Physician knowledge was high (mean 3.7/4.0), but a "knowledge–implementation gap" was evident: 85.2% agreed de-prescribing was "crucial," yet only 28.4% used an SDP. Gastroenterologists (40.0%) were twice as likely as IM physicians (20.0%; p=0.0002) to use an SDP. In the adjusted model, GI specialty (aOR 2.59) and higher self-efficacy (aOR 1.82) were the strongest predictors. The highest-rated barriers were 'Patient resistance/anxiety' (78.0%) and 'Consultation time constraints' (69.2%). In this cohort, PPI over-prescription appears driven by implementation failure and clinical inertia, not knowledge deficits. This is associated with low self-efficacy and barriers like patient anxiety and time pressure. The specialty disparity suggests confidence, not just knowledge, is key. Interventions must pivot from education to systemic solutions targeting these behavioural barriers.

Keywords: Behavioural Science, Clinical Inertia, De-prescribing, Gastroenterology, Implementation Gap, Internal Medicine, Proton Pump Inhibitors.

INTRODUCTION

Proton pump inhibitors (PPIs) are highly effective for acid-related disorders and are among the most prescribed drug classes globally [Strand *et al.*, 2017]. However, their widespread use has been paralleled by a challenge of inappropriate long-term prescribing, often extending far beyond initial indications [Fossmark *et al.*, 2019]. Observational data suggests associations between chronic PPI use and numerous adverse outcomes, including Clostridioides difficile infection, renal dysfunction, and micronutrient deficiencies [Freedberg *et al.*, 2017; Imhann *et al.*, 2016].

Professional bodies have issued guidelines for over a decade advocating for regular reassessment and de-prescribing of PPIs to the lowest effective dose, or stopping therapy when indications resolve [American Gastroenterological Association, 2022]. Despite this, de-prescribing rates in practice remain low. This persistent gap between evidence and implementation suggests the problem may not be a simple lack of physician knowledge, but a more complex phenomenon of clinical inertia—a failure to act despite recognizing the need to do so [Linsky *et al.*, 2014].

It is unknown whether this inertia is associated with cognitive barriers (e.g., diagnostic uncertainty), affective barriers (e.g., low self-efficacy, fear of patient conflict), or systemic barriers (e.g., lack of time). Furthermore, it is unclear how these factors differ between sub-specialists (Gastroenterologists, GI) and generalists (Internal Medicine, IM). This study moves beyond traditional KAP frameworks to identify the specific, actionable drivers of this implementation failure.

Experimental section

We conducted a cross-sectional, anonymous survey study between January and April 2024. The study protocol was approved by the Institutional Ethics

Committee of the Sree Uthradom Thirunal Academy of Medical Sciences (No.42/IEC/SUTAMS/2023). All participants provided digital informed consent, and all data was anonymized.

A sampling frame was generated using publicly available state medical registries from three South Indian states. We identified 950 eligible, practicing physicians (IM or GI) with valid email addresses. An invitation link to the online questionnaire (hosted on a secure university server) was emailed, followed by two reminders. A total of 328 responses were received (Response Rate: 34.5%). After excluding 18 incomplete responses (item non-response >5%), 310 complete surveys were included in the final analysis. All analyses were conducted on a complete-case basis.

No single existing instrument met our objectives. We developed a 4-part questionnaire based on a review of de-prescribing literature and the Theoretical Domains Framework [O'Mahony & Gurwitz, 2018].

- *Physician Characteristics:* Specialty, years in practice, practice setting, state.
- *Knowledge & Practices:* Knowledge was assessed via a 4-item composite score (Kuder-Richardson 20 = 0.78). The *Primary Outcome: Use of a Systematic De-prescribing Protocol (SDP)* was a binary 'Yes/No' response to the question: "Do you use a specific, systematic protocol (e.g., formal dose tapering, 'on-demand' switching) when attempting to stop or reduce PPIs in patients with resolved GERD symptoms?" The use of an SDP was chosen as the primary outcome, as a defined, systematic process is a recognized and measurable precursor to effective and scalable de-prescribing.
- *Self-Efficacy:* A 3-item scale was validated via factor analysis. An initial 4-item scale was tested, but one item was removed due to cross-loading and poor construct purity. The final 3-item scale demonstrated good internal consistency (Cronbach's α=0.89 Or Cronbach's Alpha = 0.89).
- *Barriers:* A 7-item scale ranking perceived barriers (1='Not a barrier' to 5='Very High barrier').

Data were analysed using R v4.2. A formal Statistical Analysis Plan was pre-specified. Proportions are reported with 95% Wilson score confidence intervals (CIs). The primary outcome was compared by specialty using Fisher's exact test. Group differences in the knowledge score were tested using the Mann–Whitney U test. A multivariable logistic regression model identified independent predictors of SDP use. Given the small number of clusters (N=3 states), primary p-values and CIs were derived using a wild cluster bootstrap-t (Webb weights, 9999 replications). Covariates were selected *a priori*: specialty (GI vs. IM), years of practice (continuous), practice type (private vs. public), and the 3-item self-efficacy score (continuous). The primary outcome (SDP use) was pre-specified. P-values for secondary outcomes are reported unadjusted and should be interpreted as exploratory.

RESULTS AND DISCUSSION

Of the 310 participants, 180 (58.1%) were in Internal Medicine and 130 (41.9%) in Gastroenterology. The median years of experience was 11.5 (IQR 6-18). 62.3% worked primarily in a private hospital setting. The state distribution was: Kerala (45.2%), Karnataka (30.0%), and Tamil Nadu (24.8%).

The 4-item composite knowledge score was uniformly high across specialties (Mean score 3.7/4.0; GI 3.7 vs IM 3.6, p=0.68). This high baseline knowledge contrasted starkly with practice. While 85.2% (95% CI: 80.7-88.9%) of physicians agreed that de-prescribing was "crucial," only 28.4% (23.5-3.7%) of the cohort (88/310) reported using a specific Systematic De-prescribing Protocol (SDP).

This study's findings suggest that the persistent overuse of PPIs in this cohort is not driven by a knowledge deficit, but by a failure of implementation. We identified a significant "knowledge-implementation gap" where physicians' high composite knowledge scores do not translate into the use of a formal protocol. The primary factors associated with this clinical inertia are behavioural (patient anxiety, low self-efficacy) and systemic (time constraints).

The use of SDPs differed starkly by specialty (Table I). Gastroenterologists were twice as likely to use an SDP (40.0%) as IM physicians (20.0%). This difference was highly statistically significant (p = 0.0002). Gastroenterologists also reported significantly higher self-efficacy (p = 0.0013) and more frequent long-term monitoring (p = 0.011).

Table I: Comparison of De-Prescribing Practices and Self-Efficacy by Specialty

Variable	Internal Medicine (n=180)	Gastroenterology (n=130)	Total (N=310)	P-value [a]
Primary Outcome	-	-	-	-
Use of an SDP	36 (20.0 %)	52 (40.0 %)	88 (28.4 %)	**0.0002**
(95% CI)	[14.6 – 26.6 %]	[31.6 – 48.9 %]	[23.5 – 33.7 %]	-
Risk Ratio (RR) (GI vs IM)	-	-	2.00 [1.41 – 2.84]	-
Risk Difference (RD) (GI–IM)	-	-	20.0 % [9.8 – 30.2 %]	-

Variable	Internal Medicine (n=180)	Gastroenterology (n=130)	Total (N=310)	P-value [a]
Secondary Outcomes	-	-	-	-
High Self-Efficacy [b]	74 (41.1 %)	78 (60.0 %)	152 (49.0 %)	**0.0013**
(95% CI)	[34.0 – 48.6 %]	[51.1 – 68.4 %]	[43.4 – 54.7 %]	-
Long-term Monitoring [c]	50 (27.8 %)	55 (42.3 %)	105 (33.9 %)	**0.011**
(95% CI)	[21.6 – 34.7 %]	[33.8 – 51.2 %]	[28.7 – 39.4 %]	-

a: p-values from two-sided Fisher's exact tests.
b: High Self-Efficacy = mean score ≥ 4.0 on the 3-item scale (Likert 1–5).
c: Long-Term Monitoring = responding 'Often' or 'Always' (4 or 5) to the item on follow-up for B12 or renal complications.
SDP = Systematic De-Prescribing Protocol; RR = Risk Ratio; RD = Risk Difference; CI = Confidence Interval. All proportions reported with 95 % Wilson CIs.

In the multivariable logistic regression using a wild cluster bootstrap-t, GI specialty remained the strongest independent predictor of using an SDP (aOR 2.59, 95% CI: 1.45-4.63, p=0.001). Higher 3-item self-efficacy was also independently associated with SDP use (aOR 1.82, 95% CI: 1.01-3.28, p=0.045). The model showed good discrimination (C-statistic = 0.72) and calibration (H-L p = 0.58).

The cornerstone finding is the stark, statistically robust difference between specialties, which persisted after rigorous adjustment. As hypothesized, self-efficacy is a key factor. GIs reported significantly higher confidence, and this purified self-efficacy construct was itself an independent predictor of using an SDP. This suggests an association whereby repeated exposure and training (common in GI) is linked to the confidence required to overcome inertia—confidence that may be less developed in a generalist setting.

The most highly-rated barriers were behavioural and systemic, not knowledge-based (Table II). 'Patient resistance or anxiety about symptom return' (78.0%) and 'Lack of consultation time' (69.2%) were the dominant barriers. 'Lack of knowledge of de-prescribing protocols' was ranked as the lowest barrier (14.1%).

Table II: Physician-Reported Barriers to PPI De-Prescribing, by Likert Scale Response (N=310)

Perceived Barrier	1 - Not a Barrier (%)	2 (%)	3 - Neutral (%)	4 - High Barrier (%)	5 - Very High Barrier (%)	Combined (4+5) "High Barrier" (%)
Patient Resistance/Anxiety	2.0%	5.0%	15.0%	43.0%	35.0%	78.0%
Consultation Time Constraints	3.0%	7.0%	20.8%	40.0%	29.2%	69.2%
Fear of Rebound Symptoms	5.0%	10.0%	30.0%	35.0%	20.0%	55.0%
Diagnostic Uncertainty	10.0%	14.0%	40.5%	25.0%	10.5%	35.5%
Lack of Knowledge/Protocols	40.0%	20.0%	25.9%	10.0%	4.1%	14.1%

Percentages represent the proportion of physicians who selected each rating.

Our findings refute the common assumption that "more education" is the solution. As Table II illustrates, 'lack of knowledge' is a non-issue. The real barriers are sociological. Physicians appear reluctant to initiate a time-consuming and potentially conflict-ridden conversation ('patient resistance': 78.0%) about a drug perceived as benign, especially when they fear managing the consequences ('rebound fear') [Zabiuddin Ahad *et al.*, 2021].

This study's strengths include a robust sample size with sufficient power for its primary endpoint, a pre-specified analysis plan, and a validated, construct-pure self-efficacy scale. Limitations are also important to note. First, the sampling from three South Indian states limits external validity; our findings are most directly generalizable to these healthcare contexts. The "behavioural, not educational" conclusion may not hold in regions with different baseline physician knowledge. Second, the 34.5% response rate introduces a high risk of non-response bias. It is plausible that physicians with a stronger interest in de-prescribing were more likely to respond. If so, our 28.4% SDP use rate may be an overestimate, suggesting the actual implementation gap is even larger. Third, our primary outcome was a self-reported measure of protocol use, not a direct, patient-level audit. Finally, as a cross-sectional study, we can only demonstrate association, not causation.

CONCLUSION

PPI over-prescription is a behavioural problem, not an educational one. Interventions must pivot from simple guideline dissemination to actively dismantling the barriers of clinical inertia.

Our findings provide a clear roadmap. For Internal Medicine, training must focus less on the 'why' (knowledge is high) and more on the 'how'—specifically, building self-efficacy through case-based simulation in managing patient expectations and tapering protocols.

For Health Systems, the 'time' and 'patient anxiety' barriers are systemic. Interventions should focus on "choice architecture" [Begum *et al.*, 2021], such as EMR-based de-prescribing "nudges" (e.g., mandatory stop-dates) and patient-facing educational materials that normalize the de-prescribing process.

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