A Practice-Based Approach for Converting from Proton Pump Inhibitors to Less Costly Therapy

CASE REPORT

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CONTEXT. Projected cost for lansoprazole, the formulary proton pump inhibitor (PPI) at our institution, was $1.8 million in 1999. While some patients require PPI therapy, many could control their symptoms with a histamine H_2-receptor antagonist blocker (H_2 blocker) at a much lower cost.

OBJECTIVE. To evaluate a practice-based approach to converting patients from PPIs to H_2 blockers.

DESIGN. Before–after study.

SETTING. Portland Veterans Affairs Primary Care Clinics.

INTERVENTION. We developed guidelines and educated clinicians about the use of PPIs and H_2 blockers. To help physicians convert appropriate patients from PPIs to H_2 blockers, we gave them a list of their patients receiving PPIs, form letters for patients explaining the conversion, and structured prescription forms. Patient lists and e-mail reminders, as well as feedback on institutional performance, were sent to clinicians during the intervention period.

OUTCOME MEASURES. Number of PPI and H_2 prescriptions per enrollee and pharmacy costs.

RESULTS. The average number of PPI prescriptions per enrollee at our institution decreased from 0.39 in the 9 months before the intervention to 0.27 in the 9 months after the intervention. The associated pharmacy costs decreased from an average of $43 to $28 per enrollee per quarter, a difference of $15 or a savings of $80,000 per quarter. Accounting for the decrease in medication prices during the study, this difference was $11 per patient per quarter, corresponding to a savings of about $60,000 per quarter. With respect to the conversion process, more than 70% of clinicians felt the intervention had a big impact on how they prescribed PPIs and H_2 blockers. Eighty-two percent of clinicians converted patients from PPIs to H_2 blockers during clinic time; 56% did so during administrative time. Overall, more clinicians considered the intervention to be helpful rather than a hassle.

CONCLUSIONS. The number of PPI prescriptions decreased during the intervention and was sustained at least three quarters afterward. This low-intensity, practice-based intervention may serve as a model for other health care systems.

Faced with a major budget crisis, the hospital administration at the Portland Veterans Affairs (VA) asked the medical service to find ways to lower total costs while maintaining or improving patient care. One target was to reduce the use of

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expensive medications. An obvious first choice was our use of proton pump inhibitors (PPIs), which had a projected cost of about $1.8 million for 1999. Unlike other medications, PPIs are primarily used to control symptoms rather than to prevent morbidity or mortality. Our goal was to have clinicians use the least costly drug regimen to control symptoms and prevent the complications of acid peptic disease. To do so, we developed guidelines for appropriate, cost-sensitive use of PPIs and implemented a process that made conversion from PPIs to histamine H_2-receptor antagonists (H_2 blockers) easy for clinicians and patients. To evaluate how well our PPI conversion process worked, we compared the number of prescriptions for PPIs and H_2 blockers filled and associated pharmacy costs before and after the intervention.

Methods

Setting

The project took place in the two Portland VA Primary Care Clinics (Portland, Oregon; Vancouver, Washington). Each primary care clinic has a group practice manager and weekly practice meetings. The Portland site has 30 clinicians with 14,000 patients, and the Vancouver site has 5 clinicians with 4500 patients. There were 43 internal medicine housestaff linked with 17 staff physicians at the Portland site, and 6 housestaff linked with 4 staff physicians at the Vancouver site. Attending physicians were responsible for overseeing the conversion process for housestaff.

Our VA has a restricted formulary; lansoprazole is our formulary PPI. Lansoprazole initially cost $1.65 per pill (for either a 15- or 30-mg tablet). In November 1999, the price was reduced to $1.31 per pill and in February 2000, to $1.21 per pill. Omeprazole, our nonformulary PPI, accounted for less than 10% of total PPI use and cost $1.90 for a 20-mg capsule or $3.00 for a 40-mg capsule. Only patients with documented side effects from lansoprazole can receive omeprazole. Our formulary H_2 blocker was ranitidine 150 mg, which cost $0.50 per pill until December 1998 when the price was reduced to $0.03 per pill. About 10% of patients were receiving cimetidine or famotidine because of side effects from ranitidine.

Guideline Development

A multidisciplinary group (general internists, a clinical pharmacist, and gastroenterologists) reviewed the literature to develop guidelines for the use of PPIs, particularly for symptoms of chronic gastroesophageal reflux disease (GERD). Acid suppression is recommended for chronic GERD at the lowest dose needed to control symptoms.[1] While lifestyle changes and antacid use may suffice in the 20% of patients with mild reflux, those with more symptomatic GERD require therapy based on severity of symptoms, endoscopic disease, or clinical complications. Among patients with grade 1 or 2 erosive esophagitis (single or multiple erosions on single or multiple esophageal folds), 50% to 70% were free from recurrences at 1 year when treated with ranitidine at doses of 150 mg two to three times daily.[2–4]

Symptomatic and endoscopic disease recurred more frequently with ranitidine than with omeprazole when more severe (grades 4 and 5) disease, defined as esophageal ulcers, stricture, or Barrett's epithelium, was being treated.[1–2] Disease severity is not known in patients treated empirically. From local standards of care and literature review, PPI guidelines were developed for our institution (**Figure 1**).

Conversion Process

We based our intervention on the PRECEDE model for changing clinician behavior[5] and the literature on local opinion leaders.[6, 7] The PRECEDE model consists of three strategies: predisposing (guidelines, clinician education, and "buy-in"), enabling (patient lists, special prescriptions, and patient letters), and reinforcing (individual and practice-level feedback). The model suggests that using all three strategies increases the likelihood of behavior change.

We introduced the issue of practice-based conversion from PPIs to less costly therapy at regularly scheduled primary care group meetings. A local gastroenterologist met with primary care providers to discuss cost-effective treatment of chronic GERD. The guidelines were subsequently distributed to clinicians between January and March 1999.

Our formal conversion program to facilitate change in clinical practice started in July 1999. We used the pharmacy database to identify all patients with active PPI prescriptions, the details of the prescription, (dose, expiration date), and the clinician who wrote the prescription. We sent each clinician a cover letter, a list of their patients who had active PPI prescriptions (regardless of who had written the prescription), and the guideline. Clinicians were asked to review the list of their patients with active PPI prescriptions and convert appropriate patients, on the basis of the guidelines, to H_2 blockers. Patient lists for the residents were given to their linked clinic staff for review. The cover letter also encouraged providers to seek help from the clinical pharmacists for problems. Clinicians could make these changes during administrative time or could review patients' use of PPIs as they were seen in the clinic over the next 6 months.

To make this process easier, we also provided the physicians with a "Dear Patient" form letter, which

GENERAL INFORMATION

Cost: Lansoprazole 15 or 30 mg capsule: $1.65/capsule Ranitidine 150 mg tablet: $0.03

There is no advantage to lansoprazole 15 mg BID (cost = $3.30/day) over 30 mg QD.

"Step Down": Patient on BID lansoprazole—Step down to QD.

Patient on QD lansoprazole—Step down to high-dose ranitidine (300 mg BID).

(Because of "post PPI acid rebound," initial step to 300 mg BID may be more effective than to 150 mg BID).

SHORT-TERM USE (Maximum 60 days)

1. Initial empiric Rx for GERD, noncardiac chest pain as a therapeutic trial, ENT symptoms suspected to be due to GERD, such as chronic cough or hoarseness. Many patients will do well with ranitidine 300 mg BID and lifestyle modifications. If "PPI first" approach is taken, after 8 weeks of therapy, an attempt to step down to ranitidine 300 mg BID must be undertaken.
2. Peptic ulcer disease (PUD) with or without *H. pylori*.
3. Exceptions to the 60-day limitation:
   a. During course of endoscopic variceal therapy (3 months after therapy).
   b. Therapeutic trial in GERD-related ENT symptoms (4 months maximum).

CHRONIC USE

1. GERD (including GERD-related ENT symptoms) IF
   a. Frequent GERD symptoms (near daily), despite regular use of high-dose H_2 blocker.
   b. History of esophageal ulcer or stricture (very strong evidence-based recommendation).
   c. Barrett's (high-dose H_2 blocker Rx may also be appropriate if symptoms are well controlled).
2. NSAIDs-induced gastric ulcer disease in patients who must remain on NSAIDs.
   a. Ranitidine 300 mg BID is effective; VISN guideline recommends first line.
   b. PPIs are considered, by some, to be the most effective at prevention of recurrence.
   c. Misoprostol is effective, but not well tolerated; restricted to 8-week use in elderly patients with active gastritis or PUD and who require ongoing NSAID treatment.
3. Hypersecretory states such as Zollinger-Ellison syndrome.

BID DOSING

SHORT-TERM USE

1. Initial therapy of complications of GERD, or PUD: upper GI bleed due to PUD, esophageal ulcer/stricture. Reassess after 8 weeks for possible dose reduction.
2. As part of initial *H. pylori* regimen.

CHRONIC USE

1. GERD unrelieved by QD PPI (strongly consider elective EGD).

REFERRAL FOR ENDOSCOPY IN GERD

1. Transport dysphagia—absolute indication.
2. History of Barrett's with dysplasia. Refer to GI and follow GI recommendations.
3. Consider EGD
   a. > 5-year history of GERD requiring ongoing medical management.
   b. GERD requiring BID PPI dosing.
   c. Failure of high-dose H_2 blocker to control symptoms. (Empiric treatment with maintenance PPI may be appropriate.)

FIGURE 1. Guidelines for use of proton pump inhibitors (PPIs) (lansoprazole). This guideline was distributed to clinicians as part of the intervention. BID = twice daily; EGD = esophagogastroduodenoscopy; ENT = ear, nose, and throat; GERD = gastroesophageal reflux disease; GI = gastrointestinal; QD = every day; VISN = Veterans Integrated Service Networks.

explained the change to H_2 blockers and encouraged patients to call a dedicated phone number to talk with a clinical pharmacist if they had questions, and several PPI prescription forms. Copies of the form letters and the PPI prescription forms were available in all outpatient clinic areas for providers during the conversion process.

To reinforce change, in October 1999 we gave providers a second list of their patients who were receiving PPIs. The cover letter reminded them to continue the conversion process. Several e-mails were sent to providers during the summer and fall showing the institutional results of the conversion program and reminding providers to continue the process.

Evaluation Plan

Prescribing Trends

To assess the impact of our intervention, we measured the number of prescriptions for PPIs and H_2 blockers per enrollee and their associated costs from April 1998

through June 2000. This time frame gave us three quarters of preintervention data, three quarters of data during the intervention, and three quarters of postintervention data. To summarize the effect, we averaged the number of prescriptions filled per enrollee and the cost per enrollee for the three preintervention quarters and the three postintervention quarters. We used the number of prescriptions filled per enrollee to control for an increase in prescriptions resulting from a growing number of patients using our primary care clinics.

We used our pharmacy database to identify the number of PPI and H_2 blocker prescriptions filled and associated costs each quarter. Prescriptions included all durations up to our maximum of 90 days. To learn the number of primary care enrollees each quarter, we used our administrative database to identify patients with at least one primary care visit at the Portland VA. Unlike HMOs, the VA does not receive monthly premiums from members. Instead, it tracks the number of individuals who use VA resources each fiscal year. Therefore, we defined enrollees as active VA users (i.e., patients with at least one primary care visit during the quarter) and used the terms *patient* and *enrollee* interchangeably.

A decrease in the cost of lansoprazole during the study complicated our attempt to estimate the effect of the intervention on costs. To estimate the change in costs per patient attributable to our intervention (rather than price changes), we calculated the cost of PPIs per patient for each quarter assuming a constant price for lansoprazole. Specifically, we calculated the cost per PPI prescription filled, assuming the lowest price of $1.21 per pill ($310,000/3249 prescriptions = $95/prescription). We multiplied $95 by the average number of PPI prescriptions filled per patient for the three preintervention quarters (0.39 prescriptions per patient) and the three postintervention quarters (0.27 prescriptions per patient).

Clinician Evaluation of the Conversion Process

Providers were surveyed in March 2000 to identify the components of the conversion process that had the greatest impact on their use of PPIs, how frequently they used a component, and whether a component was a hassle or helpful. They were asked to rate each component on a scale of 0 (little impact) to 5 (big impact) and on a scale of 0 (hassle) to 5 (helpful). Providers also rated the frequency with which they used a process to make the conversion on a scale of 0 (rarely) to 5 (frequently). Clinicians' responses were dichotomized into having an impact (score ≥ 3), being a hassle (score ≤ 1) or helpful (score ≥ 4), and frequent use (score ≥ 3). We used percentages to describe the clinicians' responses to the survey items.

Results

Prescribing Trends

Figure 2 and **Table 1** display the trends in PPI and H_2 blocker prescriptions filled during the preintervention (April–December 1998), intervention (January–September 1999), and postintervention (October 1999–June 2000) periods. In the preintervention period, PPIs accounted for approximately 55% of all prescriptions for PPIs and H_2 blockers. This dropped to 40% after the intervention.

The number of PPI prescriptions filled averaged 3479 per quarter with a cost of about $385,000 per quarter (9.9% of total outpatient pharmacy costs) for the three preintervention quarters (**Table 1**). By April–June 1999, after meetings with primary care providers to develop guidelines, the number of PPI prescriptions began to decrease to 3274 per quarter with a cost of about $387,000 (8.8%). For the three postintervention quarters, the total number of PPI prescriptions filled at our institution averaged 2959 per quarter, with a cost of about $305,000 per quarter (6.7%).

The number of H_2 blocker prescriptions filled averaged 2900 per quarter for the three preintervention quarters and increased to an average of 4391 per quarter for the three postintervention quarters. Although H_2 blocker prescriptions increased, our cost substantially decreased because of a significant price reduction for generic ranitidine from $0.50 per pill to $0.03 per pill in late December 1998.

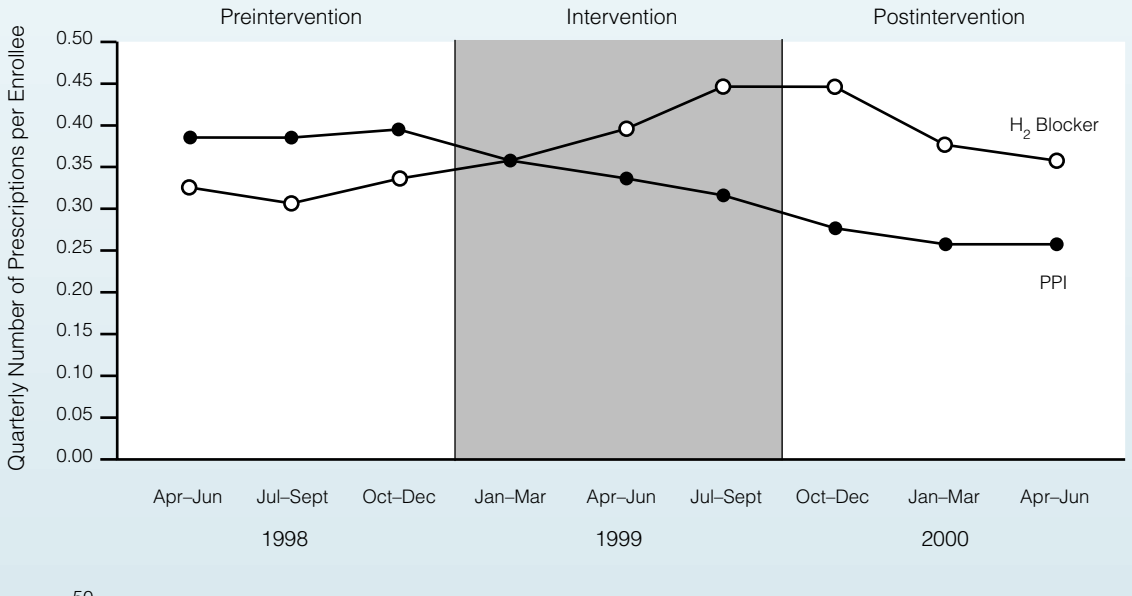
Because the number of primary care patients increased during our study period, we calculated the number of prescriptions filled per patient and cost per patient for PPIs and H_2 blockers (**Table 1**). **Figure 2** displays the trends in quarterly prescriptions per patient and cost per patient for PPIs and H_2 blockers. On average, 0.39 PPI prescriptions were filled per patient before the intervention and 0.27 after the intervention. Our average cost per patient for PPIs was $43 for the three preintervention quarters and $28 after the intervention for a quarterly average cost savings of $15 per enrollee (35% reduction) or yearly savings of $60 per patient.

To control for decreases in the cost of lansoprazole, we estimated the average quarterly PPI cost per patient using the PPI cost from April–June 2000 when lansoprazole was at its lowest price ($1.21 per pill). Had the lansoprazole price been this consistently low throughout the study, the average pre- and postintervention costs per patient per quarter would have been $37 and $26, respectively, for a savings of $11 per enrollee per quarter (30% reduction) or $44 per patient per year. Because we used the lowest price of lansoprazole, this estimate of the savings is conservative.

Clinician Evaluation of the Conversion Process

Twenty-three (66%) providers returned the survey. Fifty-two percent of these respondents spent more than 5 half-days per week in clinic. More than 70% felt that the conference with the gastroenterologist, written guidelines, list of providers' patients on PPIs, and feedback about PPI expenditures had a big impact on their behavior. In general, more clinicians reported that the components of the intervention were helpful than those who reported them to be a hassle (**Table 2**). Thirty-eight percent of clinicians felt that the PPI prescription form was a hassle versus 24% who felt it was helpful, and 35% felt the list of their patients receiving PPIs was a hassle versus 39% who felt it was helpful.

Eighty-three percent of clinicians reported that they frequently changed patients from PPIs to H_2 blockers while seeing them in clinic, yet 56% also changed prescriptions for patients during administrative time. Few providers (13%) enlisted the help of the



	Apr–Jun 1998	Jul–Sept 1998	Oct–Dec 1998	Jan–Mar 1999	Apr–Jun 1999	Jul–Sept 1999	Oct–Dec 1999	Jan–Mar 2000	Apr–Jun 2000
H_2 Blocker ($/pill)	0.50	0.50	0.50	0.03	0.03	0.03	0.03	0.03	0.03
PPI ($/pill)	1.65	1.65	1.65	1.65	1.65	1.65	1.31	1.21	1.21

FIGURE 2. Average number and cost of histamine H_2-receptor antagonist blocker (H_2) and proton pump inhibitor (PPI) prescriptions filled by quarter.

TABLE 1

Proton Pump Inhibitor and Histamine H_2-Receptor Antagonist Blocker (H_2 blocker) Prescriptions Filled and Associated Pharmacy Costs by Quarter*

PHARMACY DATA	PREINTERVENTION			INTERVENTION			POSTINTERVENTION		
	APRIL–JUNE 1998	JULY–SEPT 1998	OCT–DEC 1998	JAN–MAR 1999	APRIL–JUNE 1999	JULY–SEPT 1999	OCT–DEC 1999	JAN–MAR 2000	APRIL–JUNE 2000
Numbers of patients receiving primary care	8779	8828	8984	9533	9474	9533	9794	11,126	12,364
Outpatient prescriptions filled									
PPI	3412	3458	3567	3433	3274	3068	2702	2926	3249
H_2 blocker	2900	2770	3032	3445	3800	4263	4394	4263	4516
PPI per enrollee	0.39	0.39	0.40	0.36	0.35	0.32	0.28	0.26	0.26
H_2 blocker per enrollee	0.33	0.31	0.34	0.36	0.40	0.45	0.45	0.38	0.37
Outpatient pharmacy costs† (% of total pharmacy cost)									
PPI	$367 (10.1%)	$377 (10.0%)	$412 (9.6%)	$412 (9.8%)	$387 (8.8%)	$356 (7.5%)	$309 (6.8%)	$295 (6.5%)	$310 (6.7%)
H_2 blocker	$55 (1.5%)	$54 (1.4%)	$63 (1.5%)	$39 (0.9%)	$25 (0.6%)	$25 (0.5%)	$26 (0.6%)	$19 (0.4%)	$21 (0.5%)
Total pharmacy cost	$3631	$3752	$4280	$4186	$4418	$4766	$4520	$4534	$4602
Outpatient pharmacy costs per patient									
PPI	$42	$42	$46	$43	$41	$38	$32	$26	$25
H_2 blocker	$6	$6	$7	$4	$3	$3	$3	$2	$2
Sum PPI and H_2 blocker‡	$48	$49	$53	$47	$44	$40	$34	$28	$27

**PPI = proton pump inhibitor.*
†Costs are in thousands of dollars (U.S.).
‡Sum may differ due to rounding.

clinical pharmacist. The PPI prescription form and the electronic prescription process for documenting the reason why the PPI must be used were used frequently by clinicians—57% and 65%, respectively. Only one provider reported an adverse outcome from stepping down to a H_2 blocker (mental status changes in an elderly patient on multiple medications), and one reported that the process generated a letter to a member of Congress. The clinical pharmacist reported that fewer than 10 patients called to discuss the change in medication.

Discussion

The overall number of PPI prescriptions filled decreased, and this decrease was sustained for three quarters after the conversion process. Thus, the overall cost of PPIs decreased at a time when total prescriptions

TABLE 2
Clinicians' Perceptions of the Components of the Intervention*

COMPONENT†	HASSLE	HELPFUL
PPI prescription form	38%	24%
List of clinicians' patients receiving PPIs	35%	39%
Feedback about group expenditures for PPIs	26%	56%
Form letter for patients explaining step-down therapy	24%	43%
Written guidelines	14%	45%

**PPI = proton pump inhibitor.*
†Components were rated on a scale of 0 (hassle) to 5 (helpful). Hassles were given ratings of 0 to 1, and helpful was given ratings of 4 to 5. The percentage is based on the number of responses to each component. The number of responses varied from 21 to 23.

filled and pharmacy costs increased. We estimated a savings of $11 (30% reduction) to $15 (35%) per patient per quarter. In contrast, national sales of antiulcer medications remained among the top three revenue-producing drugs, and omeprazole was the highest revenue-producing drug, doubling its sales from 1998 to 1999.[8] In Oregon, Blue Cross/Blue Shield reported per-member, per-quarter PPI costs of $1.07 in October–December 1998, which increased slowly to $1.92 in April–June 2000. (Note: These figures encompass members of all ages, including children.) The cost of H_2 blockers per member did not change during the same period (Allen JA. Personal communication). This represents a 79% increase in per-member, per-quarter costs compared with a 30% decrease in per-enrollee, per-quarter costs at the Portland VA. Our savings should continue, since new PPI prescriptions require providers to consider the same guidelines.

Our evaluation has several limitations. First, it is an observational study at a single VA Medical Center. Other factors might have contributed to the decrease in percentage of PPI prescriptions filled. The lack of a control group makes it impossible to know if secular events independent of the intervention might have led to prescription conversions. Although the process and results should be generalizable to health care organizations with similar electronic databases, the study should be replicated to assess generalizability. Second, the effect of the intervention on costs may be confused by decreases in the costs of lansoprazole and increases in the total number of prescriptions filled, so we can only estimate the potential cost savings. However, we took a conservative approach to estimating these savings. Third, we did not calculate the costs of the intervention, including that of the clinical pharmacist's time. However, we did not hire new personnel to implement the intervention. The cost data also do not account for possible extra visits or tests for patients who did poorly with the conversion. Finally, we did not assess appropriateness of the conversions, patient satisfaction, or clinical outcome. Another study suggests that patients are concerned about changing from an effective therapy like a PPI to other drugs, but would change if their provider suggested it.[9] In the fall of 1999, our pharmacists tracked 142 patients converted from PPIs to H_2 blockers. They found that 44 patients (31%) were restarted on PPIs within 6 months after conversion to H_2 blockers (Hirokane G. Personal communication). Clinicians and pharmacists at our institution reported that the only patient problems encountered were increased symptoms (which responded promptly when the PPI was restarted) and one potential adverse drug reaction.

Providers surveyed found that consensus on appropriate PPI use (conference with a gastroenterologist and written guidelines) had a big impact on their clinical management, as did providing them with population-based information (lists of their patients on PPIs, feedback about their patients on PPIs, and institutional expenditures) during the process. They also reported that the lists and PPI prescription form were a hassle. We suspect that clinicians viewed this intervention as "one more thing they should do" in the course of their busy practices. This has implications for implementation of this intervention and other provider-based interventions. Organizations should consider the number and types of changes providers are being requested to make at any one time. The "hassle" might have prevented our ability to successfully implement the intervention if other major changes were occurring at the same time.

This low-intensity intervention that incorporates a population-based approach into the clinicians' individual practices appears to be effective and may serve as a model for other health care systems. This approach involves primary care clinicians and gives them the tools to make appropriate decisions for their patients and practice. However, it should not be used at a time when clinicians are being asked to make other changes that might increase their workload.

Take-Home Points

- The difference in cost between proton pump inhibitors (PPIs) and histamine H_2-receptor antagonists (H_2 blockers) is considerable. Although some patients require PPI therapy, many could be converted to H_2 blockers.
- We developed guidelines for use of PPIs with input from local experts and clinicians and educated a group of clinicians at two VA primary care clinics.
- Clinicians were asked to use these guidelines to review a list of their patients on PPIs for possible conversion to H_2 blockers. To facilitate these changes, providers were given "Dear Patient" form letters, PPI prescription forms, ongoing feedback about the results, and regular reminders.
- The number of PPI prescriptions filled decreased during the intervention and was sustained for 9 months after the intervention, which translated to a quarterly savings of between $11 and $15 per patient per quarter or between about $60,000 to $80,000 per quarter. Clinicians reported that the written guidelines, feedback about group PPI expenditures, and patient form letters were most helpful.
- This relatively simple approach to changing practice patterns should be tried in other health care organizations.

REFERENCES

1. Harris RA, Kupperman M, Richter JE. Prevention of recurrences of erosive reflux esophagitis: a cost-effectiveness analysis of maintenance proton pump inhibition. Am J Med. 1997;102:78-88.
2. Vigneri S, Termini R, Leandro G, et al. A comparison of five maintenance therapies for reflux esophagitis. N Engl J Med. 1995;333:1106-10.
3. Janisch H, Huffemann W, Bouzo M. Cisapride vs. ranitidine in treatment of reflux esophagitis. Hepatogastroenterology. 1998;35:125-27.
4. Geldof H, Hazelhoff B, Otten MH. Two different dose regimens of cisapride in treatment of reflux oesophagitis: a double-blind comparison with ranitidine. Aliment Pharmacol Ther. 1993;7:409-15.
5. Green LW, Kreuter MW, Deeds SG, Partridge KB, Bartlett E. Health Education Planning: A Diagnostic Approach. Palo Alto, CA: Mayfield Press; 1980.
6. Davis DA, Thomson MA, Oxman AD, Haynes RB. Changing physician performance: a systematic review of the effect of continuing medical education strategies. JAMA. 1995;274:700-5.
7. His RG, MacDonald R, Davis WK. Identification of physician educational influentials in small community hospitals. Proc Conference Res Med Educ. 1978; 7: 283-8.
8. http://www.pharmacytimes.com/top200.html.
9. Boath EH, Blenkinsopp A. The rise and rise of proton pump inhibitor drugs: patients' perspectives. Soc Sci Med. 1997; 45:1571-79.

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