RESEARCH

Effect of a Therapeutic Maximum Allowable Cost (MAC) Program on the Cost and Utilization of Proton Pump Inhibitors in an Employer-Sponsored Drug Plan in Canada

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ABSTRACT

BACKGROUND: Therapeutic maximum allowable cost (MAC) is a managed care intervention that uses reference pricing in a therapeutic class or category of drugs or an indication (e.g., heartburn). Therapeutic MAC has not been studied in Canada or the United States. The proton pump inhibitor (PPI) rabeprazole was used as the reference drug in this therapeutic MAC program based on prices for PPIs in the province of Ontario. No PPI is available over the counter in Canada.

OBJECTIVE: To evaluate the utilization and anticipated drug cost savings for PPIs in an employer-sponsored drug plan in Canada that implemented a therapeutic MAC program for PPIs.

METHODS: An employer group with an average of 6,300 covered members, which adopted the MAC program for PPIs in June 2003, was compared with a comparison group comprising the book of business throughout Canada (approximately 5 million lives) without a PPI MAC program (non-MAC group). Pharmacy claims for PPIs were identified using the first 6 characters of the generic product identifier (GPI 492700) for a 36-month period from June 1, 2002, through May 31, 2005. The primary comparison was the year prior to the intervention (from June 1, 2002, through May 31, 2003) and the first full year following the intervention (June 1, 2004, through May 31, 2005). Drug utilization was evaluated by comparing the market share of each of the PPIs for the 2 time periods and by the days of PPI therapy per patient per year (PPPY) and days of therapy per prescription (Rx). Drug cost was defined as the cost of the drug (ingredient cost), including allowable provincial pharmacy markup but excluding pharmacy dispense fee. Cost savings were calculated from the allowed drug cost per claim, allowed cost per day, and allowed cost PPPY.

RESULTS: (All amounts are in Canadian dollars.) The MAC intervention group experienced an 11.7% reduction in the average cost per day of PPI drug therapy, from $2.14 in the preperiod to $1.89 in the postperiod, compared with a 3.7% reduction in the comparison group ($2.16 vs. $2.08). Utilization dropped by 11.9% in the intervention group, from 166.7 days of PPI drug therapy PPPY to 146.9 days PPPY, compared with an increase of 7.9% in the comparison group, from 136.1 days to 146.8 days PPPY. The combined effect of the decrease in drug cost per day and utilization was a 22.1% reduction in allowed drug cost PPPY in the intervention (MAC) group (from $357 to $278 PPPY) versus a 4.1% increase in the comparison group (from $293 to $305 PPPY).

CONCLUSION: A MAC program for PPIs for one employer in Canada was associated with savings for the drug plan sponsor of approximately 8% in actual drug cost per day of therapy compared with the comparison group. Total savings after consideration of utilization was approximately 26% for the intervention group versus the comparison group.

KEYWORDS: Pharmacy benefits manager, Managed care, Proton pump inhibitors, Drug utilization

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Note: *An editorial on the subject of this article appears on pages 402-05 of this issue. A commentary appears on pages 398-401.*

Pharmacy benefits managers (PBMs) play an important role in the delivery of health care and in the reduction of drug costs for employers.[1] PBMs provide comprehensive drug benefits packages to employer groups as well as design and administer cost-effective drug formularies.[1,2] Various benefit management strategies such as cost sharing, tiered copayments, therapeutic formularies, prior authorization, therapeutic interchange, and maximum allowable cost (MAC) programs have been used to manage the cost of pharmaceuticals.[3] By providing cost-saving incentives, these programs have also led to changes in drug utilization.[4]

A MAC program is based on the principles of a therapeutic interchange program. Instead of recommending a switch to a presumed therapeutically equivalent product, the ingredient cost of a specific list of drugs is reimbursed only at the allowed price of a reference drug.[5] Patients are required to pay the difference in drug cost if a nonpreferred drug is dispensed. Ideally, drugs selected for the inclusion in the MAC program are therapeutically equivalent in safety and efficacy, have similar patient convenience profiles (e.g., doses per day and palatability of dose form), and have similar effectiveness.[5] For 2 drugs with therapeutic equivalence, the higher value drug is the one that costs the least. Therapeutic MAC programs may lead to changes in physician prescribing patterns because of the financial incentive for patients to seek the preferred (lower out-of-pocket cost) drugs.

Proton pump inhibitors (PPIs) are one of the fastest growing drug classes and are second only to cholesterol-lowering drugs in drug cost among all paid prescription claims in Canada.[6] PPIs suppress the secretion of gastric acid by inhibiting the final step of acid production at the secretory surface of the parietal cells.[7]

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TABLE 1 Average Allowed Cost of PPIs in 2005*

Drug Name	Cost per Day ($)	Excess Cost (%)†
Omeprazole 20 mg tablet	2.55	78
Esomeprazole 40 mg tablet	2.44	71
Pantoprazole 40 mg tablet	2.21	55
Lansoprazole 30 mg capsule	2.20	54
Rabeprazole 10 mg EC tablet	1.43 (2 x 10 mg)	–

** Allowed cost is the allowed drug ingredient cost including allowable provincial pharmacy markup, approximately 10% in Ontario, but excluding pharmacy professional fee. All costs are expressed in Canadian dollars.*

† Cost per day in excess of rabeprazole cost per day.

EC=enteric coated; PPI=proton pump inhibitor.

They are indicated for a variety of conditions including gastroesophageal reflux disease, peptic ulcer disease, and *Helicobacter pylori* eradication. They also provide protection during nonsteroidal anti-inflammatory drug use. At equivalent doses, all PPIs (rabeprazole, omeprazole, esomeprazole, pantoprazole, and lansoprazole) are similar in efficacy and safety and provide no therapeutic advantage over one another.[8-11] Although PPIs are very effective, the high utilization and cost of these medications pose a significant burden on both public and private payers. Various cost-saving measures have been used to limit the financial impact of this drug class, such as changing the benefit design to lower drug plan member copayment for a lower-cost PPI and to increase the member copayment for higher-cost PPIs.[12]

The PPI drug class is ideal for a therapeutic MAC program. Since June 9, 2003, PPIs have been included in the therapeutic MAC program administered by ESI, Canada, a large PBM. In this MAC program, all electronic claims submitted to ESI Canada for a nonpreferred PPI would be targeted and cut back to the price of rabeprazole—the reference-price or preferred drug. Rabeprazole was chosen as the preferred drug based on price differences in the province of Ontario. The difference in drug cost between the submitted drug Rx and rabeprazole would be an additional out-of-pocket cost to the patient. In order to avoid the increase in out-of-pocket cost, the patient may request an Rx for the preferred drug in the future or ask the pharmacist to contact the physician for the therapeutic switch.

This study was designed to evaluate the impact of a MAC program on utilization and price of PPI drug therapy in a Canadian employer-sponsored drug plan.

Methods

All pharmacy claims for PPIs with dates of service from June 1, 2002, through May 31, 2005, were included in the analysis. A national employer group with an average of 6,300 members (employees, spouses, and dependents) adopted the MAC program for PPIs in June 2003. The employer group consists of covered members throughout Canada; the majority were located in the provinces of Ontario and Quebec. The comparison (non-MAC) group consisted of all pharmacy claims for PPIs in the PBM's book of business in Canada, excluding the MAC group. Covered members are located throughout Canada, with the majority located in the provinces of Ontario and Quebec. Drug cost, as listed in Table 1, is the allowed cost of the drug (ingredient cost), including allowable provincial pharmacy markup (approximately 10% in Ontario) but excluding the pharmacy professional fee.

A pharmacy claims database of a large Canadian PBM was used to extract data for the study. This PBM manages pharmacy benefits for more than 5 million Canadians covered by private employer-sponsored drug plans with more than 900,000 PPI claims per year. Claims for PPIs were identified using the 6 digits (492700) of the Medi-Span Generic Product Identifier (GPI). Drug utilization was evaluated by comparing the claims (Rx) market share of the various PPIs for the 2 time periods and by the days of PPI therapy per patient per year (PPPY) and days of therapy per claim. The incidence of PPI use and Rx claims PPPY were calculated.

The primary cost measure in this study was the allowed drug ingredient cost, which included the drug cost markup but not the pharmacy professional fee. The primary financial impact measures were drug ingredient cost per claim, allowed drug cost per day, and allowed drug cost PPPY. The study periods of principal interest were the 1-year preintervention period, from June 1, 2002, through May 31, 2003, and the 1-year postintervention period, from June 1, 2004, through May 31, 2005.

Results

Rabeprazole 10 mg had an allowed drug cost of approximately $0.71 per tablet, or $1.43 per day of therapy (Table 1). The other 4 PPIs ranged in "excess" cost compared with rabeprazole, from $0.77 per day (54%) for lansoprazole 30 mg capsule to $1.12 per day for omeprazole 20 mg tablet. All costs in this article are expressed in Canadian dollars.

Utilization and PPI Market Share

In year 1, prior to the inclusion of PPIs in the MAC program on June 9, 2003, the market share of rabeprazole was small and similar for the MAC group and non-MAC comparison group at 1% and 2%, respectively (Table 2). In year 3, the first full year following the PPI MAC intervention, the MAC group had an absolute increase of 21% in rabeprazole market share, to 22% of PPI pharmacy claims. The non-MAC group experienced an absolute increase of 7 points, from 2% in 2003 to 9% in 2005.

Esomeprazole use increased in the MAC group from 13% in year 1 to 21% in year 3, and the non-MAC group experienced a similar increase, from 17% in year 1 to 23% in year 3. Omeprazole use declined as esomeprazole use increased.

TABLE 2 Market Share of PPIs in MAC and Non-MAC Groups*

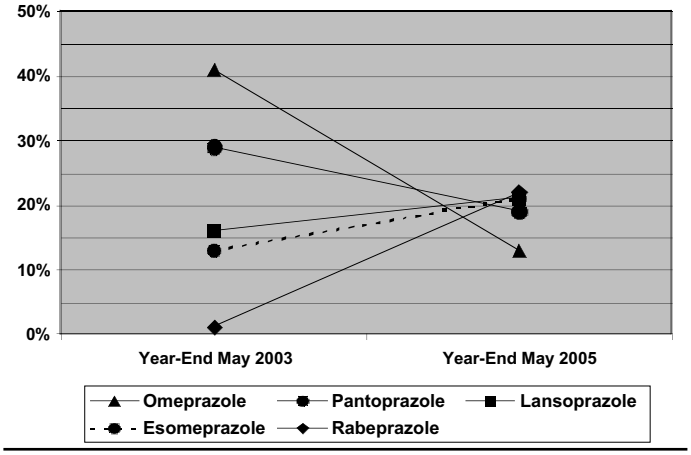
	MAC		Non-MAC	
	Year-End May 2003 (%)	Year-End May 2005 (%)	Year-End May 2003 (%)	Year-End May 2005 (%)
Omeprazole	41	13	40	24
Esomeprazole	13	21	17	23
Pantoprazole	29	19	25	26
Lansoprazole	16	21	16	14
Rabeprazole	1	22	2	9

** Market share is expressed as a percentage of pharmacy claims (Rx) for the 5 proton pump inhibitors.*
MAC = maximum allowable cost; PPI = proton pump inhibitor.

Omeprazole use declined from 41% in year 1 to 13% in year 3 in the MAC group and from 40% in year 1 to 24% in year 3 in the non-MAC group. The increase in use of rabeprazole in the MAC group appeared to occur primarily at the expense of the market share of pantoprazole and omeprazole (Figure 1), while pantoprazole use was stable for the non-MAC group, at 25% to 26% over the study periods. Lansoprazole use increased in the MAC group (16% and 21%) but showed very little change in its use in the non-MAC group (16% and 14%) over the study period.

Utilization of PPIs was 22% higher in the MAC group versus the comparison in the preintervention period for year-end May 31, 2004 period, 166.7 days of therapy PPPY versus 136.1 days PPPY (Figure 3). For year-end 2005, the utilization of PPIs converged for the 2 groups, declining by 11.9% in the MAC group to 146.9 days PPPY and increasing 7.9% to 146.8 days PPPY in the non-MAC group. Compared with the non-MAC group, utilization in the MAC group decreased by about 19.5% from the preintervention period to the year-end May 31, 2005 period.

FIGURE 1 Market Share by Number of Claims (Rxs) for PPIs in the Intervention (MAC) Group



MAC = maximum allowable cost; PPI = proton pump inhibitor; Rx = prescription.

Price

The average allowed drug cost per day declined by 11.7% in the MAC group, from $2.14 in the preintervention period to $1.89 in the year-end May 31, 2005 period (Figure 4). The average allowed drug cost per day declined by 3.7% in the non-MAC group, from $2.16 in the preintervention period to $2.08 in the year-end May 31, 2005 period. Compared with the change in the non-MAC group, the average allowed drug cost per day declined by about 8% per day.

Combined Effects of Price and Utilization

The average allowed drug cost declined 22.1%, from $357 PPPY in the MAC group in the preintervention period to $278 in the year-end May 31, 2005 period (Figure 5). The average allowed drug cost increased by 4.1% in the non-MAC group, from $293 PPPY in the preintervention period to $305 in the year-end May 31, 2005 period. Compared with the non-MAC group, the MAC group experienced an approximate 26% decreased in the average allowed drug cost PPPY.

Discussion

The use of a MAC program had considerable impact on the utilization of PPIs and was associated with approximate PPI drug cost savings PPPY of 26% compared with the non-MAC employer groups of this PBM in Canada. The employer group that adopted the MAC intervention for PPIs had higher utilization of PPIs and higher PPI costs in the preintervention period compared with other employer groups managed by this PBM. The effect of this MAC intervention for PPIs in reducing the average price by about 8% and overall per-patient PPI costs by about 26% compares with 38% net PPI savings associated with an intervention that involved primarily benefit design. Over a 30-month period of evaluation that ended May 31, 2005, West et al. found that adding coverage of omeprazole OTC in a state employee health plan, beginning on March 1, 2004, with a $5 copayment per prescription and $50 copayment for brand PPIs, was associated with net drug cost savings of 37.6% despite an increase in PPI utilization.[13] In the present study, a decline in

TABLE 3 Drug Cost and Utilization of PPI Drugs for Years Ending May 2003 and May 2005*

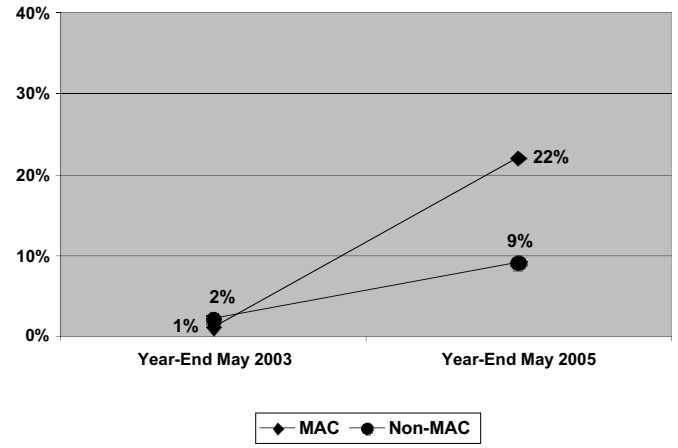
	MAC (Intervention Group)			Non-MAC (Comparison Group)		
	Year-End May 31, 2003	Year-End May 31, 2005	% Change	Year-End May 31, 2003	Year-End May 31, 2005	% Change
Number of claims (Rx)	1,145	1,292		627,136	911,344	
Number of days of therapy	51,675	54,925		27,185,301	41,389,313	
Total allowed drug cost	$110,528	$104,062		$58,589,305	$85,947,070	
Days of therapy per Rx	45.1	42.5	-5.8	43.3	45.4	4.8
Average allowed drug cost per claim	$96.53	$80.54	-16.6	$93.42	$94.31	0.9
Average allowed drug cost per day	$2.14	$1.89	-11.7	$2.16	$2.08	-3.7
Number of patients	310	374		199,747	281,951	
Claims PPPY†	3.69	3.45	-6.5	3.14	3.23	3.0
Days of therapy PPPY	166.7	146.9	-11.9	136.1	146.8	7.9
Average allowed drug cost PPPY	$357	$278	-22.1	$293	$305	4.1

** All costs are expressed in Canadian dollars. Cost is the allowed drug cost (ingredient cost) including allowable provincial pharmacy markup, approximately $10 per prescription claim in Ontario.*

† Paid claims (Rxs) are net of claim reversals.

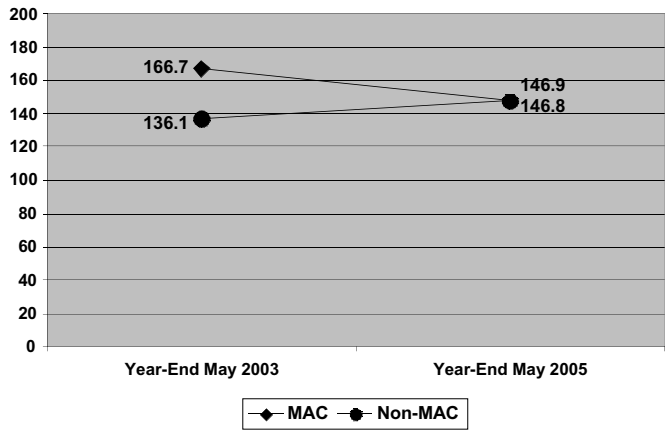
MAC = maximum allowable cost; PPI = proton pump inhibitor; PPPY = per patient per year.

FIGURE 2 Market Share by Number of Claims (Rxs) for Rabeprazole for Intervention (MAC) Versus Comparison (Non-MAC) Group



MAC = maximum allowable cost; Rx = prescription.

FIGURE 3 Utilization of PPIs in Days Per Patient Per Year



MAC = maximum allowable cost; PPI = proton pump inhibitor.

PPI utilization accounted for almost three fourths of the net PPI drug cost savings in the MAC group.

Utilization of the preferred drug, rabeprazole, accounted for only 22% of all pharmacy claims for PPIs in the MAC group in the 12-month period ending May 31, 2005. Larger savings could have been achieved if the MAC intervention resulted in all claims being switched to the preferred drug. If all PPI pharmacy claims were adjudicated at the MAC price, $1.43 per day in this intervention, the drug cost savings would have been 33%, based on an average PPI price per day of $2.14.

The intervention in the present study was associated with a fairly modest increase in utilization of the preferred drug, 22% of all PPI pharmacy claims versus 9% in the non-MAC group. This relative 144% difference represents an absolute difference of only 13 points. Therefore, this MAC intervention appeared to not have had a dramatic effect on drug prescribing by physi-

cians. The process involved in delivering pharmacy services for PPI prescriptions warrants additional elaboration.

When processing claims in a pharmacy for a PPI other than the preferred PPI, a message is generated from the PBM indicating that only the MAC will be paid. Pharmacists are responsible for letting the patients know that their drug will not be fully reimbursed because the preferred drug was not prescribed. If cost is a concern for the patient, the physician is contacted by either the patient or the pharmacist requesting a change to the preferred drug. There is, however, an exception process, in which the patient will be reimbursed for the nonpreferred drug cost should the physician determine, based on clinical judgment, that the nonpreferred product may be beneficial to the patient.

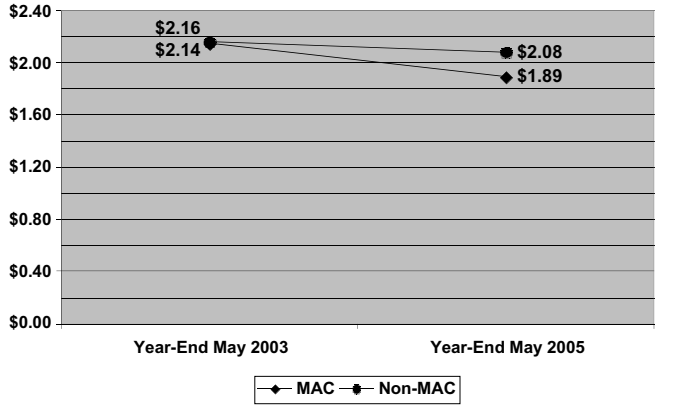
This PPI MAC program may have had spillover effects on physician prescribing that were not measured. Spillover occurs when physicians prescribe the preferred drug on a restrictive formulary not only for the patients of the specific third-party payer but also for other patients. Spillover effects may be caused by the inability of physicians to keep track of all formulary changes of their patients and the avoidance of noncompliance issues. This results in the physician choosing the preferred drug on the restrictive formulary for patients with unknown formularies. Wang et al. demonstrated that a restrictive formulary for PPIs generated spillover effects, especially in cash paying and other third-party payer markets.[14] Therefore, the PPI MAC program may lead to changes in drug utilization for all patients, and spillover effect might explain some of the increase in rabeprazole utilization in the non-MAC groups.

Limitations

Foremost among the limitations in this study is the absence of consideration of the effect of a therapeutic MAC pricing method on drug plan member cost-share. The principal measure in this study was the allowed drug cost, composed of the product markup and the cost of the drug from the wholesaler. Member cost-share was not available to the researchers in the present study. This limitation prevented assessment of the relative impact/contribution of member cost-share to the net drug cost savings for this employer group. On the other hand, focusing on allowed drug cost only permitted isolation of the effect of drug mix on overall PPI drug cost.

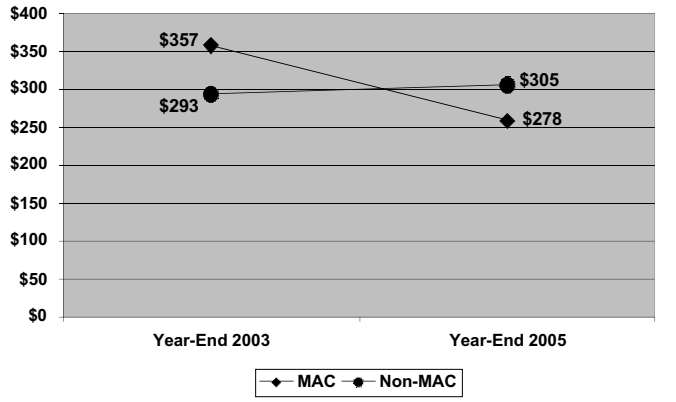
Second, there was variation in PPI utilization in the comparison group that could not be controlled. The 10 provincial public health plans in Canada have various programs to encourage the use of lower-cost PPIs. For example, in British Columbia, a reference-based pricing program exists where the province will pay only up to the cost of the reference drug. In Ontario, rabeprazole is considered to be a full benefit benchmark. The geographical area for this PBM includes all provinces in Canada; therefore, the programs implemented by other provinces likely exhibit an additional spillover effect for the non-MAC claims in each province.

FIGURE 4 Actual Average Allowed Cost per Day for All PPIs for Intervention (MAC) Versus Comparison (Non-MAC) Group*



** Canadian dollars. MAC = maximum allowable cost; PPI = proton pump inhibitor.*

FIGURE 5 Average PPI Drug Cost Per Patient Per Year*



** Canadian dollars. MAC = maximum allowable cost; PPI = proton pump inhibitor.*

Third, the incidence of PPI use in the MAC group in the preintervention period was substantially higher compared with the non-MAC group. This was no doubt part of the motivation for the employer group to adopt the MAC intervention for PPIs. Nevertheless, regression to the mean could account for some of the decline in PPI utilization in the MAC group. In any case, the utilization of PPIs as measured by days of therapy PPPY was nearly identical in the MAC group and the non-MAC group in the 12-month period ending May 31, 2005.

Fourth, the PPI market experienced much change during the 3-year period of the present study. Esomeprazole was introduced to the Canadian market on August 28, 2001, and rabeprazole was introduced on July 8, 2002. These additions probably explain some of the increases in pharmacy claims for

PPIs. Generic omeprazole was introduced in January 2004; however, it was subsequently taken off the market due to a patent dispute and was reintroduced on June 3, 2005. In Manitoba, generic omeprazole was made fully interchangeable with brand Losec, effective June 15, 2004.

The PPI market continues to change in Canada since generic omeprazole is now priced lower than rabeprazole. Changes in drug prices combined with changes in practice contribute to difficulty in predicting future savings from a MAC program for PPIs.

Conclusion

A MAC intervention for 5 PPIs saved approximately 26% in allowed PPI drug cost for one employer in Canada compared with other employer groups without the MAC intervention. The PPI drug cost savings were attributed less than one third to the average price of the PPIs and more than two thirds to a decline in utilization of PPIs in the MAC group. Utilization of PPIs in days of therapy per patient was nearly identical in the MAC and non-MAC groups after the MAC program was imposed.

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