A Model To Estimate Drug Plan Cost Savings From a Trial Prescription Program

OBJECTIVE: To develop a model to estimate potential drug-plan cost savings from a trial prescription program, to test the model using data from existing trial prescription programs, and to determine the sensitivity of predicted cost savings to variation in program parameters.

DESIGN: Information on trial prescription programs was obtained from the published literature, project reports, and personal communications with program administrators. Conceptual models of the determinants of trial prescription initiation and discontinuation were used to guide the development of a spreadsheet-based cost estimation model that used prescription claims data. The model was tested by comparing predicted to actual cost savings for a trial prescription program in a private drug plan. Sensitivity analyses were performed to determine critical model inputs.

SETTING: Provincial pharmacy associations and other organizations known to have developed or participated in trial prescription programs.

RESULTS: Inaccurate estimates of eligible prescriptions and their average daily drug cost, possibly attributable to a change in insurer, resulted in an inaccurate prediction of net cost savings. Model results were sensitive to trial-entry rate, discontinuation rate, daily drug cost, and the number of days supply dispensed in the absence of a trial.

CONCLUSION: To achieve maximal return on investment, trial prescription programs should target drugs with high cost and adverse-effect rates. Before trial prescription programs can be fully endorsed as a managed care strategy, however, peer-reviewed research is needed.

KEYWORDS: Trial prescription programs, prescription cost containment, quantity control strategies, drug use management

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Health care costs, and drug costs in particular, have been increasing steadily over the past decade. In Canada, expenditures for pharmaceuticals now constitute 15% of health care costs, an amount that exceeds expenditures for physician services. One reason for the rapid growth in drug costs is that usage of more costly brand-name products is increasing faster than usage of generic products. Various medicine-cabinet clean-up campaigns in recent years have established that medication wastage and its associated costs are substantial. Wastage is particularly intolerable when the health care system is so financially strained.

A trial prescription program is a community pharmacy-based, managed care strategy to reduce medication waste. A trial prescription is a new prescription for chronic drug therapy that is dispensed in two parts: an initial trial quantity (usually for seven days) and, if appropriate, the balance. Dispensing a limited quantity on first exposure to a drug limits wasteage due to lack of efficacy or the patient’s inability to tolerate the drug. Trials are typically implemented on expensive medications with a higher incidence of adverse drug reactions, such as nonsteroidal anti-inflammatory drugs (NSAIDs) and cardiovascular drugs such as calcium channel blockers (CCBs). The key pharmacist activities in a trial prescription program are:

- confirming that the patient has not received the drug before;
- obtaining patient consent;
- dispensing 7–10 days supply;
- following up by phone to assess side effects and compliance;
- if appropriate, dispensing balance of original prescription; and
- documenting outcome of the trial prescription.

Two modes of payment have been used to reimburse the pharmacy for trial prescription services: a second dispensing fee if the balance of the prescription is dispensed, or a patient-monitoring fee paid on all trials after follow-up has been completed. With the monitoring-fee system, no second dispensing fee is paid if the balance of the prescription is dispensed.

The first trial prescription program in Canada was established in the British Columbia Pharmacare Program in 1993. Programs have also been implemented in provincial drug plans in Saskatchewan, Quebec, Nova Scotia, and Alberta, and demonstration projects in private-sector drug plans, typically organized by provincial or local pharmacy associations, have been carried out in Alberta and Ontario. In late 1999, Liberty
Health launched an ongoing trial prescription program for General Motors employees in Ontario. In 2000, new programs were scheduled to begin in four federal drug plans in Saskatchewan and in the Ontario provincial drug plan.

Pharmacy associations in Canada support trial prescription programs because they present a relatively straightforward opportunity for pharmacies to provide cognitive services for which third-party payors are willing to provide reimbursement, since the mechanism by which they produce cost savings is direct and tangible. Despite their popularity in Canada, these programs do not seem to be offered much in other countries. Moreover, no evaluations of trial prescription programs have been published in peer-reviewed journals, although brief reports have appeared in pharmacy trade publications. Thus, third-party payors have access to very little information on which to base decisions about adopting trial prescription programs. In particular, the net cost savings for the drug plan is difficult to predict.

The objectives of this project were to develop a model to estimate potential drug plan cost savings from a trial prescription program; to test the model using data from existing trial prescription programs; and to determine the sensitivity of predicted cost savings to variation in program parameters. The perspective adopted was that of a third-party payor.

### Methods

#### Literature Review and Model Development

International Pharmacy Abstracts, Medline, and HealthStar databases were searched from 1985 to 1999 using the unrestricted term “trial prescriptions.” Pharmacy periodicals in Canada were prospectively monitored from January 1998 to December 2000 for news items about trial prescription programs. Provincial pharmacy associations and other organizations known to have developed or participated in trial prescription programs were contacted to obtain program descriptions and results, if this information had not appeared in the published literature.

Features of prominent Canadian programs are compared in Table 1, above. Commonalities are (1) the drugs selected for trial lists are mainly cardiovascular agents (antilipemics, angiotensin-converting enzyme [ACE] inhibitors, and calcium channel blockers).
channel blockers [CCBs]), gastrointestinal drugs (proton pump inhibitors and cytoprotective agents), and NSAIDs; (2) pharmacy payment has consisted, in all but one program, of a professional fee with each dispensing of the prescription (trial quantity and balance); and (3) patient participation has been voluntary.

Only the Metropolitan Toronto Managed Medication Use Program (MMUP), the Saskatchewan program, and the Ontario Round Table on Appropriate Prescribing (ORTAP) program have full reports of program results.8, 17, 19 Information about the other programs had to be gleaned from press releases, presentations, news items in pharmacy magazines, or personal communication. Nevertheless, some noteworthy observations emerged (see Table 2, above):

- The trial discontinuation rate was substantial in most programs (36%–53%); however, the Alberta and ORTAP community-based programs' discontinuation rates were just 13% and 14% respectively.
- Trial-entry rates have been low, whether calculated as a percentage of all prescriptions for drugs on the trial list (0.5%–16%) or as a percentage of "trial opportunities" (2.6%–11%). The exception is the MMUP program, where the entry rate was approximately 52%–58% of trial opportunities. ("Trial opportunities" are defined in the ORTAP report as the number of new prescriptions for drugs on the trial list, where "new" was defined as no claim for the same drug within the previous year. It should be noted that true trial opportunities will actually be fewer than this because some new prescriptions will not meet the specified minimum number of days supply and some prescription recipients will have had prior exposure to the drug from a physician sample or out-of-plan prescription.)8, 20
- Reported cost savings have often been coarse estimates because of data limitations and assumptions. Amounts have varied widely (i.e., $1,800–$150,000 per year) but in general have been modest (e.g., net savings of $52,000 per year in a drug plan covering 1.6 million lives).21

Because data for evaluating a trial prescription program are linked to the prescription, it is useful to examine determinants of program success at three points in the trial prescription process: prescription eligibility for a trial, prescription entry into a trial, and trial-prescription discontinuation. The behav-
iors of multiple participants in the medication-use process (physician, patient, pharmacist, and claims administrator) determine the numbers of prescriptions at each stage, and hence the cost savings achieved from the program.

**Prescription Eligibility for Trial**

Even when a prescription is for a drug that is both expensive and often poorly tolerated, a trial is only appropriate if the drug has not been used previously and the quantity of the prescription is sufficiently large to justify splitting it into two portions—the trial quantity and the balance. Otherwise, the cost to implement the trial will likely outweigh the benefit. Therefore, it has been recommended that only drugs typically prescribed for a minimum of 21 days should be selected for a trial drug list. Similarly, pharmacists should not initiate trials when less than a 21-day supply has been prescribed.
The most accurate yet feasible way to estimate the number of prescriptions eligible for trial is to obtain data from the plan's prescription claims database on the number of prescriptions dispensed in the prior year for drugs on the trial list, dispensed in a 21-day supply or greater, and not dispensed previously (e.g., within the prior 12-month period). The number of eligible prescriptions will be somewhat overestimated because prior drug use involving an outside-of-the-plan prescription or physician sampling cannot be detected. To identify a prior prescription for the same drug, the claims processor must search the database for drug-identification numbers that represent all of the products and strengths for the same drug entity. Generic product identification codes (e.g., Medispan, Inc.) facilitate this process.

**Entry of Eligible Prescription into a Trial**
Entry of an eligible prescription into a prescription trial depends on whether the pharmacist approaches the patient about the trial opportunity and whether the patient agrees to participate. The pharmacist's ability to approach the patient depends on awareness of the trial prescription program, knowledge of program procedures, and ability to identify eligible prescriptions. The first two depend on effective dissemination of information about the program. The latter depends on the availability of aids to identify eligible prescriptions, the most reliable of which is a computerized flag on entry of the prescription claim. Programs without computerized flags have had lower trial-entry rates (e.g., 4% of trial opportunities in ORTAP; 2.6% in Alberta) than those with this capability (e.g., 52%–58% of trial opportunities in MMUP).

### Table 3: Model for Estimating Drug Cost Savings from a Trial Prescription Drug Plan

<table>
<thead>
<tr>
<th>Step</th>
<th>Estimate Obtained</th>
<th>Suggested Data Source or Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Number of eligible prescriptions&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Claims for eligible prescriptions in the prior year in the drug plan's database</td>
</tr>
<tr>
<td>Alternate A-1</td>
<td>Total prescriptions per annum</td>
<td>Total prescription claims in the prior year in the drug plan's database</td>
</tr>
<tr>
<td>A-2</td>
<td>Proportion of prescriptions for drugs on the trial list</td>
<td>A trial prescription program in a similar drug plan</td>
</tr>
<tr>
<td>A-3</td>
<td>Number of prescriptions for drugs on the trial list</td>
<td>([A-1]x[A-2]) or from the drug plan's claims database</td>
</tr>
<tr>
<td>B</td>
<td>Trial entry rate as a proportion of eligible prescriptions</td>
<td>A trial prescription program in a similar drug plan</td>
</tr>
<tr>
<td>Alternate B-1</td>
<td>Trial entry rate as a proportion of all prescriptions for drugs on the trial list</td>
<td>A trial prescription program in a similar drug plan</td>
</tr>
<tr>
<td>C</td>
<td>Number of trials initiated</td>
<td>(AxB) or ([A-3]x[B-1])</td>
</tr>
<tr>
<td>D</td>
<td>Discontinuation rate for trial prescriptions</td>
<td>A trial prescription program with a similar trial drug list</td>
</tr>
<tr>
<td>E</td>
<td>Number of trial prescriptions discontinued</td>
<td>=C x D</td>
</tr>
<tr>
<td>F</td>
<td>Trial period (days)</td>
<td>Typically seven days</td>
</tr>
<tr>
<td>G</td>
<td>Average number of days supplied on eligible prescriptions in the absence of the trial program</td>
<td>Claims for eligible prescriptions in the prior year in the drug plan's database</td>
</tr>
<tr>
<td>Alternate G-1</td>
<td>Average number of days supplied on all prescriptions for drugs on the trial list</td>
<td>Claims for all prescriptions for drugs on the trial list in the prior year in the drug plan's database</td>
</tr>
<tr>
<td>H</td>
<td>Total drug costs for eligible prescriptions</td>
<td>Drug cost for eligible prescriptions in the prior year in the drug plan's claims database</td>
</tr>
<tr>
<td>Alternate H-1</td>
<td>Total drug costs for all prescriptions for drugs on the trial list</td>
<td>Drug cost for all prescriptions for drugs on the trial list in the prior year in the drug plan's claims database</td>
</tr>
<tr>
<td>I</td>
<td>Average daily drug cost for eligible prescriptions (alternative is to calculate for all prescriptions)</td>
<td>[H/A]/G or [H-1/A-3]/G-1</td>
</tr>
<tr>
<td>J</td>
<td>Average days supply saved when trial is discontinued</td>
<td>G - F</td>
</tr>
<tr>
<td>K</td>
<td>Estimated drug cost savings from trial prescription program</td>
<td>E x I x J</td>
</tr>
</tbody>
</table>

<sup>a</sup>An eligible prescription is defined as a new prescription for a drug on the trial list (e.g., no prescription for that drug within the previous 12 months) where the quantity prescribed is above a specified minimum.
Similarly, patients may not be able or willing to consent to participate in a prescription trial. Inconvenience may be a factor in refusing; a patient may not be able, or want, to return to the pharmacy in seven days for the balance of the prescription, particularly in rural areas. If the pharmacist is able to offer delivery (particularly free delivery), inconvenience becomes less important. Patient beliefs and attitudes are also factors. For instance, the patient may suspect the pharmacist or the drug plan of a self-serving motive in proposing a trial prescription. Negative attitudes are more likely if the pharmacist does not have an established relationship with the patient or, in the case of private drug plans, if employer-employee relations are poor. The pharmacist’s skill in explaining the trial prescription program to the patient may head off or temper negative attitudes about the program. Finally, the patient may simply not be able to consent because a person other than the patient may have brought the prescription to the pharmacy.

Patient refusal rates seem to vary considerably across studies. Patient factors such as age, other conditions, and other medications; and on the prescriber’s skill in matching a drug to patient need. Thus, the discontinuation rate for a drug category may vary according to the population covered by the drug plan and to regional differences in prescribing practices.

Two large trial prescription programs have reported drug-discontinuation rates by therapeutic class. In the Saskatchewan program these rates were 54% for NSAIDs, 37% for antidepressants, and 34% for CCBs. In the MMUP they were 61% for NSAIDs, 46% for gastrointestinal drugs, and 32% for cardiovascular drugs.

Patients will vary in their willingness to tolerate adverse effects and in their appreciation of the importance of the drug to their health. Counseling and support provided by the physician and pharmacist (e.g., how to manage adverse drug reactions, how long to wait for the expected effect) can modify patient attitudes toward their therapy. Explanation of the drug’s health benefit is especially important in the treatment of asymptomatic diseases such as hypertension and hyperlipidemia.

The form of payment to the pharmacy may influence the pharmacist’s behavior. If a professional fee is paid when the balance of the prescription is dispensed, then the pharmacist’s financial incentive is to convince the patient to continue on the drug or to enroll only those patients who are likely to continue on the drug. A more favorable incentive is created if the pharmacist is paid one standard professional fee for all dispensing-related services connected with the trial prescription, and a separate “cognitive service” fee for the additional monitoring and assessment required to determine whether the balance of the prescription should be dispensed.

The higher the discontinuation rate, the greater the cost savings to the plan in avoided drug wastage. This assumes that the same discontinuation rate would have occurred without the trial prescription program. However, it is possible that the trial prescription program itself could cause drug discontinuation because it requires the patient to return to the pharmacy to pick up the balance of the prescription if delivery is not possible. This inconvenience could be a deterrent to medication adherence.

<table>
<thead>
<tr>
<th>Model Input</th>
<th>Base-Case Estimate and Rationale</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial-entry rate</td>
<td>15% (rate achieved in the MMUP, in which flagging of trial drugs was computerized)</td>
<td>0.5%–20%</td>
</tr>
<tr>
<td>Trial-discontinuation rate</td>
<td>40% (approximates the average rate achieved across programs)</td>
<td>15%–50%</td>
</tr>
<tr>
<td>Average daily drug cost</td>
<td>$1.10 (from the MMUP)</td>
<td>$0.50–$2.00</td>
</tr>
<tr>
<td>Number of days prescribed</td>
<td>30 days (recommended minimum for prescription eligibility)</td>
<td>30–100 days</td>
</tr>
</tbody>
</table>

Note: MMUP is Medication Management Use Program, Metropolitan Toronto.
*Defined as the number of trials initiated as a proportion of total prescriptions for drugs on the trial drug list.
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**TABLE 5** Cost Savings from a Trial Prescription Drug Program: Model Estimate versus Reported Results

<table>
<thead>
<tr>
<th>Model Inputs</th>
<th>Estimated Amount</th>
<th>Reported Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drug cost savings calculation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total prescriptions per year</td>
<td>217,847$^a$</td>
<td>196,775</td>
</tr>
<tr>
<td>Annual number of prescriptions for drugs on the trial list</td>
<td>72,616$^a$</td>
<td>19,871</td>
</tr>
<tr>
<td>Total prescription cost for drugs on the trial list</td>
<td>$3,993,880</td>
<td>$1,007,415</td>
</tr>
<tr>
<td>Percentage of prescriptions for drugs on the trial list</td>
<td>33%</td>
<td>10%</td>
</tr>
<tr>
<td>Trial-entry rate (defined as the proportion of all prescriptions for drugs on the trial list)</td>
<td>11%$^b$</td>
<td>15.5%</td>
</tr>
<tr>
<td>Number of prescriptions entered in a trial</td>
<td>7,988</td>
<td>3,095</td>
</tr>
<tr>
<td>Discontinuation rate</td>
<td>46%$^b$</td>
<td>53%</td>
</tr>
<tr>
<td>Number of discontinued trials</td>
<td>3,674</td>
<td>1,636</td>
</tr>
<tr>
<td>Average daily drug cost per trial prescription</td>
<td>$1.33$^c$</td>
<td>$1.09$^d$</td>
</tr>
<tr>
<td>Days supply saved when trial prescription discontinued</td>
<td>93</td>
<td>93</td>
</tr>
<tr>
<td><strong>Trial program operating cost calculation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional professional fees</td>
<td>$41,840</td>
<td>$10,865</td>
</tr>
<tr>
<td>Additional transaction costs</td>
<td>$11,982$^e$</td>
<td>$4,554</td>
</tr>
<tr>
<td><strong>Results</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug cost savings</td>
<td>$454,483</td>
<td>$165,514</td>
</tr>
<tr>
<td>Program operating costs</td>
<td>$53,822</td>
<td>$15,419</td>
</tr>
<tr>
<td>Net savings</td>
<td>$400,661</td>
<td>$150,095</td>
</tr>
<tr>
<td>Net savings as a proportion of total prescription cost for drugs on the trial list</td>
<td>10%</td>
<td>14.9%</td>
</tr>
<tr>
<td>Return on investment</td>
<td>744%</td>
<td>973%</td>
</tr>
</tbody>
</table>

$^a$ Claims in the prior year  
$^b$ Estimated from the rate reported in another trial prescription program  
$^c$ Calculated as the average price ($55) of prescriptions for drugs on the trial drug list in the prior year, divided by the number of days supply per prescription, estimated at 34  
$^d$ Derived from reported aggregate cost savings and reported assumption that 93-days supply would have been saved  
$^e$ The number of additional transactions was estimated at 1.5 (1 for each prescription entered into the trial following rejection of the initial claim plus 0.5 for the proportion in which the balance was dispensed). The charge for each additional transaction was $1.

Return on Investment (ROI) = Net savings/Operating costs 

where:  
Drug cost savings = number of trials discontinued x number of days supply saved x mean daily drug cost, and  
Program operating costs = additional fee claims + program administration costs

Additional fee claims are professional fees for dispensing the balance of the prescription or for patient monitoring of each trial prescription. Program administration costs are additional transactions that occur when the initial prescription claim is entered at the pharmacy and a claims rejection message is returned by the claims administrator, requiring resubmission of the claim, either with an override code or as a trial prescription. Another additional transaction occurs when a claim is entered for the balance of the trial prescription.

The steps in estimating drug-cost savings are outlined in Table 3, page 395. There are three key variables in the model: the trial-entry rate, the trial-discontinuation rate, and the average daily drug cost. Both the discontinuation rate and daily drug cost will depend on the eligible drugs. These variables can be estimated across all drugs on the list, for each therapeutic category, or for each individual drug. Since the discontinuation-rate estimate must be based on results from another trial prescription program, the analyst will be limited to the data available. However, if there is a choice it is preferable to obtain discontinuation-rate estimates for each therapeutic category from the other plan and then to calculate an expected overall discontinuation rate by weighting the rate for each category by the number of eligible prescriptions in that category in the plan's own database. The weighting will tailor the discon-
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tination rate to the plan's unique prescription mix. When discontinuation-rate estimates are obtained by therapeutic category, it is important that the plan chosen as a source of the estimate(s) have similar drugs in each category. The analyst should also be mindful that even if trial drug lists are similar, an estimate from another trial prescription program cannot take account of factors such as sociodemographic or epidemiologic differences in the covered population that affect vulnerability to side effects and willingness to continue on the drug.

The level of information for daily drug cost must correspond to the level for the discontinuation rate. Therefore, if the discontinuation rate is estimated for each therapeutic category, the daily drug cost must also be estimated by therapeutic category. The plan can use its own claims database, however, to estimate daily drug cost. A simple approach is to take the total cost of claims in the therapeutic category less the total fees paid and divide by the total days supplied, if this information is available.

Estimating the trial-entry rate is more problematic. An estimate must be obtained for the number of prescriptions that would be enrolled into a trial, expressed as a proportion of either the number of eligible prescriptions (defined earlier as new prescriptions for more than a 21-day supply of a drug on the trial list); the number of prescriptions for drugs on the trial list (irrespective of new or repeat status); or the total number of plan prescriptions. The advantage of defining trial-entry rate in terms of the first denominator is that it separates prescription eligibility, which is largely dependent on patient history and therefore cannot be manipulated, from pharmacist and patient-based behavioral determinants of the number of trials initiated, which are a function of how the program is implemented and may differ across plans. Use of the second denominator to define trial entry does not account for the mix of new versus repeat prescriptions (i.e., eligibility) in the trial drug categories; use of the third denominator also does not take into account the proportion of the plan's prescription volume that is attributable to drugs on the trial drug list.

Although the denominator can be obtained from the plan's claims database, the numerator (i.e., the number of trials initiated) must be estimated from another trial prescription program. To control for differences between plans in total prescription volume, proportion of total prescriptions for drugs on the trial list, or new versus repeat prescriptions, data on the number of trials initiated should be obtained as a proportion either of eligible prescriptions or of total plan prescriptions. If number of trials initiated is obtained as a proportion of eligible prescriptions, this will be the model input. If it is obtained as a proportion of total plan prescriptions, then this rate can be refined by applying it to the new plan's total prescriptions to calculate the estimated number of trials that will be initiated. The estimated number of trials can then be expressed as a proportion of the number of eligible prescriptions in the plan, determined from the plan's own claims database. A similar adjustment can be made if the entry rate had been obtained as a proportion of all prescriptions for drugs on the trial list.

Using the Model To Predict Cost Savings

We applied the model to a trial prescription program in a municipal employer's self-insured drug plan (13,000 employees plus retirees and dependents). The predictive validity of the model was tested by comparing the annual cost savings estimated by the model to actual cost savings subsequently reported.

This trial prescription program had been proposed to the employer by the local pharmacy association as an alternative cost-containment strategy to switching to a mail-order pharmacy provider. The association guaranteed that the savings from the trial prescription program would exceed savings from the lower professional fee charged by the mail-order pharmacy ($5 every three months, versus approximately $10 every month). Because the employer wanted to achieve the cost savings as soon as possible, as it would have if it switched to a mail-order pharmacy provider, the trial prescription program was planned and implemented hastily. The project ran for one year.

The claims adjudicator programmed the system so that any claims submission for a drug on the trial list generated a rejection message to the pharmacy noting that the prescription was trial-eligible. This required the pharmacist to resubmit the claim either with an override code or as a trial prescription. The trial prescription supply was set at seven days. The pharmacist was to follow up by calling the patient on the sixth day to assess tolerance for the drug. If the outcome of the assessment was positive, then the balance of the prescription, up to a 30-day supply, could be dispensed. Only after three consecutive one-month refills without problems could the pharmacist provide a three-month supply, providing prescriber authorization had been obtained.

Because the plan was just in the process of implementing an online claims adjudication system, the only relevant data that could be retrieved from its prior paper-based claims system were total prescriptions in the prior year, the number of prescriptions for drugs on the trial list, and the average cost for each of these prescriptions. Estimates of proportion of the trial-entry rate and discontinuation rate were obtained from a demonstration trial prescription program in another private drug plan. The average daily drug cost was estimated from the average prescription price in the prior year for a drug on the trial list, which was $55 (Can). This was reduced by the dispensing fee to obtain the average drug cost per prescription, and divided by an estimated supply of 34 days, to obtain an average daily drug cost of $1.33. A 34-day supply is the amount that pharmacists normally provide when the prescription indicates that a month's supply should be dispensed.

The fee paid for dispensing the balance of the trial prescription was a usual and customary fee, which varied across pharmacies. This was estimated at the average professional fee in Ontario ($9.70). The claims adjudicator charged a $1 fee per
additional transaction. We estimated the number of additional transactions at 1.5 per trial prescription initiated (one for each prescription entered into the trial following rejection of the initial claim, plus 0.5 for the proportion in which the balance was dispensed).

Using the Model To Facilitate a Comparison of Results Across Programs

The reported results for the above trial prescription program differed greatly from those reported by a provincial drug plan, despite similar trial prescription volume and program operating costs.\(^3\) Net cost savings for the employer plan were $150,096 on 3,095 trial prescriptions, while those for the provincial plan were $23,600 on 2,619 trial prescriptions. The analysis of the provincial plan assumed that without the trial prescription program a 34-day supply would have been dispensed; for the private drug plan, the assumption was that a 100-day supply would have been dispensed, as would be the case in a mail-order program. We used the model to standardize the assumption about the number of days supply that would have been dispensed and to recompute program results.

Identifying Critical Inputs

The sensitivity of model results to variability in trial-entry rate, trial-drug discontinuation rate, average daily drug cost, and days supplied on eligible prescriptions not subjected to a trial was explored using a threshold analysis approach. In the one-way sensitivity analysis, all model inputs were held constant while one was varied in order to determine the point at which net savings would be realized (the threshold or break-even point). To determine how the selection of drugs for the trial list affects savings, we conducted a two-way sensitivity analysis on the two parameters that depend upon the drugs selected, drug discontinuation rate, and average daily drug cost. Base case estimates and ranges for each parameter varied in the sensitivity analysis are provided in Table 4, page 396.

The following assumptions were made about the trial prescription program in the sensitivity analysis:

• seven-day trial period;
• one additional transaction charge ($1 Can) applied to each trial prescription;
• reimbursement for trial prescription services in the form of a second professional fee for dispensing the balance, set at $9.70 (Can);
• program duration of one year; and
• 20,000 prescriptions annually for drugs on the trial drug list.

Results

Table 5, page 397, shows that the model greatly overestimated both drug cost savings and program operation costs for the trial prescription program in the employer drug plan, thus overestimating net savings and underestimating return on investment. When the employer drug plan calculation was based on dispensing a 34-day supply (rather than a 100-day supply), net savings decreased from $150,095 to $32,633 on 3,095 trial prescriptions, or $10.54 per trial initiated. In the provincial drug plan, trial prescription savings were $23,629 on 2,619 trial prescriptions or $9.02 per trial initiated. This difference in net savings is much smaller. Under the 34-day supply assumption, the return on investment was 212% and 158% for the employer drug plan and the provincial drug plan, respectively.

In the one-way sensitivity analysis, the threshold value (break-even point) for average daily drug cost was approximately $0.75. When the daily cost of a targeted drug was below $0.75, the trial program expense exceeded the drug cost savings. Return on investment was not sensitive, however, to the trial-entry rate. It was 48% irrespective of trial-entry rate; net savings, on the other hand, increased with trial-entry rate. The threshold for the trial-discontinuation rate was 31% and that for the number of days supply was 30. The two-way sensitivity analysis on daily drug cost and trial-discontinuation rate showed that, as daily drug cost increased, the break-even point for the trial-discontinuation rate became lower: at a daily drug cost of $0.50 it was approximately 50%, at $0.75 it was 40%, at $1.00 it was 33%, at $1.50 it was 24%, and at $2.00 it was 19%.

Discussion

The large discrepancy between estimated and actual cost savings in the employer drug plan illustrates the axiom that a model is only as good as the quality of its data inputs. The main culprits were the proportion of prescriptions for drugs on the trial drug list (33% estimated versus 10% actual) and the average daily cost of a trial drug ($1.33 estimated versus $1.09 actual). These estimates had been based on claims data from the prior year provided by the drug plan sponsor and insurer of 72,616 prescription claims for drugs on the trial list with an average cost of $55 per prescription, compared to 217,847 total prescriptions in that year. In calculating the average daily drug cost, error was also introduced by assuming a 34-day supply on the average $55 prescription, in the absence of claims data on average days supplied per prescription.

Net cost savings were sensitive to the average daily drug cost, the number of days that would have been supplied in the absence of a trial, and the discontinuation rate. The number of days supplied is determined by both plan policy and prescribing practice. In an evaluation of the Saskatchewan program, surveyed pharmacists identified the small quantities typically prescribed on new prescriptions as a program barrier, although this problem was not identified in other programs.\(^7\) Because average daily drug cost and likelihood of trial discontinuation are a function of which drugs are selected for the trial list, differences in cost savings across programs might be explained by differences in trial drug lists and in the use of drugs on the lists.

Return on investment was not sensitive to the trial-entry rate
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because both drug product cost savings (the numerator of the return on investment) and program operating costs (the denominator of the return on investment) are affected by the trial entry rate (or number of prescriptions entered into a trial). With each prescription entered, the expected drug-product cost savings increase, but so do the additional fees paid (transaction and professional fees).

Differences in assumptions about the number of days supply that would have been dispensed in the absence of the trial prescription program accounted for most of the differences in estimated costs savings when the provincial plan program and employer plan program were compared. The remaining difference could be accounted for by differences in pharmacy reimbursement for trial prescription services: the provincial drug plan paid an alternative reimbursement fee ($7.50) on each trial initiated for the patient monitoring services provided, whereas the employer drug plan paid a second fee (approximately $9.70) only if the prescription balance was dispensed.

Model Limitations and Applications
The model includes variable costs only, that is, those attached to the processing of each prescription. In particular, it does not take into account start-up costs, such as a programmer’s time to set up a system that will flag prescriptions eligible for trial or the development and dissemination of information on program procedures to pharmacies, prescribers, and plan enrollees.

Discontinuation rates and daily drug costs vary by therapeutic category and drug utilization within a therapeutic category varies across plans with different patient populations. The predictive accuracy of the model would therefore be improved if cost savings were calculated for each therapeutic category (e.g., NSAIDS, CCBs, etc.) or even for each drug being considered for the trial drug list—although the tradeoff is an increase in the complexity of data retrieval and analysis.

The model presented in this paper has several applications. It can be used to predict cost savings from a planned trial-prescription program. It permits the analyst to manipulate program features, such as the fee paid to the pharmacy or claims administrator and the list of eligible drugs, to determine the best way to structure the program. Finally, it can be used to compare results between different trial prescription programs by standardizing program features that differ.

A major limitation of the model, however, is that it estimates the impact of trial prescription programs on prescription drug plan costs only. It does not address their potential impact on inappropriate physician visits, long-term medication adherence, or health outcomes and their attendant resource implications. To the best of our knowledge these effects have not been measured. In the future, evaluators of trial prescription programs should consider including measures of this type.

Careful thought should be given to which drugs should go on the trial prescription list. As long as the identification of prescriptions eligible for trial is computerized (i.e., flagged online) the length of the list need not be a consideration. Indeed, in both the Saskatchewan and MMUP trial prescription programs, pharmacist participants thought that the limited number of drugs on the trial prescription list was a program barrier. The goal should be to include all drugs on the list for which the expected marginal benefit (cost avoided) exceeds the expected marginal cost (the additional professional fees and transaction costs). Therefore, the strategy should be to include all drugs typically used for chronic therapy, for which the unit cost and incidence of intolerable side effects (a proxy for expected discontinuation rate) are above the bivariate thresholds identified for that plan.

Third-party payors must appreciate the importance of online flagging of prescriptions to the success of a trial prescription program, but also need to be aware of the additional transaction costs generated. It has been recommended that information on the quantity and days supply of the trial prescription be entered by the pharmacist along with information about the amount originally prescribed, to minimize the number of transaction messages and thus transaction costs.

A trial prescription program should be evaluated using accurate methods and the results used to modify the program to enhance effectiveness. At a minimum, a drug plan should know by trial drug or trial-drug category how many prescriptions were enrolled in the trial, the quantity prescribed, and the proportion for which the balance was not dispensed. It should also aim to obtain as precise an estimate as possible of the trial-entry rate. The rate should be the proportion of eligible prescriptions enrolled, where eligibility is defined by a new prescription (e.g., no other claim within the prior 12 months) for at least a 30-day supply of medication. It should also measure patient refusal rates and, if possible, the reasons given for refusal.

Conclusions
The model presented is a useful tool for predicting cost savings from a trial prescription program and for identifying influential determinants. Accurate estimates of model inputs such as the number of eligible prescriptions and the average number of days prescribed are critical to accurate prediction of cost savings. Thus, plan sponsors should be cautious about using data from other drug plans to predict cost savings in their own program and should aim for estimates by drug category or even by drug. To achieve maximal cost savings, trial prescription programs should target drugs with high costs and high incidence of adverse effects and plan administrators should adopt strategies that facilitate enrollment of eligible prescriptions into a trial, including effective dissemination of program information to pharmacies and plan enrollees and computerized flagging of eligible prescriptions. Before trial prescription programs can be fully endorsed as a managed care strategy, however, peer-reviewed research is needed. Both third-party payors and phar-
macy networks need high quality evidence with rich detail in order to make accurate predictions and effective decisions about implementing or participating in trial prescription programs.

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