Impact of a cost sharing drug insurance plan on drug utilization among individuals receiving social assistance

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Abstract

Background: A cost-sharing drug insurance plan has been implemented among people receiving social assistance who had previously free access to medications. Objective: To assess the impact of this drug plan on the use of three classes of medications: inhaled corticosteroids, neuroleptics and anticonvulsants. Methods: From the computerized drug databases of the Régie de l’assurance maladie du Québec (RAMQ), we selected three random samples of Quebec residents receiving social assistance between August 1992 and June 1997 and aged 64 years or less: 55 890 users of inhaled corticosteroids, 29 461 users of neuroleptics and 44 916 users of anticonvulsants. We also obtained data for individuals privately insured by the Commission de la construction du Québec (control group). Comparison of the monthly consumption of medications before and after the new drug plan was done using time series models. Results: For individuals receiving social assistance and using inhaled corticosteroids, we observed a statistically significant decrease of 37% of the monthly consumption for the 11 months following the new drug plan. For neuroleptics and anticonvulsants, we observed a non significant decrease of 9 and 10%, respectively. No decrease in drug consumption was observed in the control group. Conclusion: Inhaled corticosteroids was the only class of medications that was found to decrease significantly after the implementation of the drug insurance plan.

Keywords: Cost sharing drug plan; Low income; Time series

1. Introduction

Several states and provinces in the United States and in Canada have in the last decade changed their policies regarding drug reimbursement for low income individuals and the elderly, frequently introducing consumer cost sharing [1–5]. Cost containment in healthcare has usually been the goal of these changes, although another motivation is to inhibit unnecessary utilization of drugs via payment by the beneficiary each time a prescription is dispensed. Some studies have shown that cost sharing policies may decrease the quantity of dispensed medications that are considered effective and essential, but little is known about the impact of such policies on the consump-
tion of specific medications [1, 6–8]. Can cost sharing policies have a different impact on different medications that are considered effective and essential? This phenomenon may be especially important when individuals affected by cost sharing policies have a low income and have to choose between different medications, or to choose between medications and other life essentials.

In August 1996, the Régie de l’assurance-maladie du Québec (RAMQ), the government body responsible for medical insurance registration in the Canadian province of Quebec, introduced a new cost-sharing drug insurance plan for all residents of the province receiving social assistance [9]. Before this new cost-sharing drug insurance plan, medications included in the Quebec drug formulary were available at no charge. During the first 4 months following the implementation of the plan (August–December 1996), beneficiaries were required to pay 25% of the cost of their medications, up to a maximal contribution of $83.33 (Canadian dollars) for this period of 4 months. Since January 1, 1997, the plan has three components: a deductible of $25 every 3 months, a coinsurance of 25% of the cost of the medications and a ceiling contribution of $50 per 3 months. This implies that, within a 3-month period, the medications will become free after the person had reached the maximal contribution of $50 (coinsurance and deductible). It also implies that a person may have to spend up to $200 per year for his/her medications. People who were and continue to be privately insured for their medications were not affected by the implementation of this cost sharing drug plan.

Concerned that these new policies could have a negative impact on the use of effective and essential medications among this low income population, we investigated whether the consumption of three classes of medications, namely neuroleptics, anticonvulsants and inhaled corticosteroids, was affected by the introduction of the cost sharing drug plan.

We also considered, as a control group, Quebec residents insured for their medications by a private insurance company, the Commission de la construction du Québec (CCQ). During the years 1996 and 1997, individuals insured with this company had to pay between 20 and 25% of the cost of each prescription claimed, after reaching a deductible varying from 15 to 60 $ per family per 6-month period. After reaching an annual ceiling of 750 $ per family, the medications were entirely paid by the CCQ. There was no change to the CCQ drug plan between 1996 and 1997.

2. Methods

2.1. Source of data

This study was based on data coming from the Quebec health insurance computerized databases administered by the RAMQ (intervention group) and from a private insurance company, the Commission de la construction du Québec (control group).

The Prescription Drug Database of the RAMQ includes information on the medications dispensed to the residents of Quebec receiving social assistance, namely the date and name of the medications, up to a maximal contribution of $83.33 (Canadian dollars) for this period of 4 months. Since January 1, 1997, the plan has three components: a deductible of $25 every 3 months, a coinsurance of 25% of the cost of the medications and a ceiling contribution of $50 per 3 months. This implies that, within a 3-month period, the medications will become free after the person had reached the maximal contribution of $50 (coinsurance and deductible). It also implies that a person may have to spend up to $200 per year for his/her medications. People who were and continue to be privately insured for their medications were not affected by the implementation of this cost sharing drug plan.

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leptics, we obtained all the 29,461 individuals receiving social assistance who had at least one of these medications dispensed during the study period and for anticonvulsants we obtained a 50% random sample formed of 44,916 individuals receiving social assistance. For each study subject we obtained information on all prescriptions that they filled between August 1, 1991 and June 30, 1997.

The CCQ is a labor union which administers its own drug plan. It insures more than 60,000 persons, mainly construction workers and their families, and more than 97% of its clientele is aged 64 years or younger. Using this database, for each of the three drug classes under study, we obtained the number of prescriptions claimed per month from January 1993 to June 1997. Claims data were not available before January 1993.

2.2. Choice of drug classes

We studied the consumption of neuroleptics including phenothiazines, thioxanthenes and others; anticonvulsants, including barbiturates, deoxybarbiturates, benzodiazepines, hydantoin, succinimides, iminostilbenes, valproic acid and others; and inhaled corticosteroids, including beclomethasone, budesonide, flunisolide, fluticasone and triamcinolone.

We decided to study these medications because they have been shown to be effective in the treatment of chronic diseases, and an abrupt ending of one of these therapies may have serious consequences on the patient’s health. Inhaled corticosteroids are used for the treatment of asthma [11], neuroleptics are mainly used for the treatment of schizophrenia [12], and anticonvulsants are used for the treatment of epilepsy [13].

2.3. Research design

To investigate changes in drug utilization following the implementation of the new policy (August 1, 1996), we used time series analyses with control series [14,15]. For each drug class separately we formed two series: the control series using data from the CCQ (January 1993 to June 1997) and the intervention series using data from the RAMQ (August 1992 to June 1997).

In contrast to individuals receiving social assistance, individuals insured by the CCQ were not affected by the implementation of the cost sharing drug plan. For this reason, this group formed a reasonable control group.

2.4. Statistical analysis

For each drug class under study, we calculated the total number of prescriptions dispensed per month from August 1992 to July 1996 for the intervention series and from January 1993 to July 1996 for the control series. It is worth noting that the unit of analysis is the number of prescriptions dispensed per month and not the patient. Patients were thus contributing to the analysis only after their entry into the cohort and only for the months in which they had filled a prescription of the studied medications. Using this unit of analysis we thus assumed that the population was stable during the implementation of the cost sharing drug plan, i.e. between August 1996 and January 1997, which is reasonable over such a small period of time. For changes in population over the whole study period, the analysis chosen (time series analysis) did take care of observed trends. In 1992, 673,938 persons receiving social assistance were insured by the RAMQ for their medications, and the corresponding figures for 1993/1997 were the following: 720,516, 750,368, 757,429, 762,686 and 746,507 persons. For CCQ the corresponding figures for 1993/1997 were the following: 66,658, 53,691, 51,618, 56,008, 65,860 persons.

Plots of the number of dispensed prescriptions exhibited a monthly fluctuation as well as seasonal cycles of 12 months (the period) and an obvious long-term trend. For each drug class and each of the two groups, we performed a time series analysis using the S-PLUS software [16]. We fitted multiplicative Seasonal Autoregressive Integrated Moving–Average (SARIMA (p, d, q) × (P, D, Q),) models where s represents the period (i.e. 12 months in our analyses), (p, d, q) the between-season model and (P, D, Q) the between-period model [17]. SARIMA models were chosen because they are able to take into account the fact that the
data fluctuate 1 month from the other (using data from the previous months), the seasonality of the data, as well as long term trends in predicting the monthly consumption of medications. Time series analysis was chosen because it can take into account the changes observed in drug consumption before the implementation of the cost sharing drug plan to predict the use of medications after its implementation. For example, if an increase in drug consumption is seen from 1992 to 1996, due to an increase in drug consumption per patient or due to an increase in the number of patients treated, the model will use this information to predict the use after the implementation of the cost sharing drug plan and impose an increasing trend after the implementation. The final models were chosen based on the lowest Akaike’s information criterion (AIC) which allows us to choose the best model in the family of SARIMA models [16,17].

Using these models and the data prior to June 1996, we predicted for each drug class and each of the two groups (RAMQ and CCQ), the number of prescriptions dispensed monthly from August 1996 to June 1997, as if the cost sharing drug plan had not been implemented. The estimated numbers of dispensed prescriptions were compared with the observed numbers of dispensed prescriptions for the 11 months following the implementation of the cost sharing drug plan (August 1996 to June 1997). It is worth noting that we excluded the month of July 1996 to built models which were not influenced by the hoarding effect seen during that month.

3. Results

Table 1 displays the age and gender distribution for the three samples of study subjects receiving social assistance and insured by the RAMQ. Users of inhaled corticosteroids were the youngest group with a mean age of 39 years. Users of neuroleptics and anticonvulsants have similar age distributions with a mean close to 42 years. Approximately 50% of users of neuroleptics and anticonvulsants were males, while only 39% of users of inhaled corticosteroids fell in this category.

The consumption over time of the three medications under study is plotted in Figs. 1–3. For inhaled corticosteroids and neuroleptics, a SARIMA $(0, 1, 1) \times (0, 1, 0)_{12}$ model was selected, among competing alternatives, based on AIC [16,17]. For anticonvulsants we selected a SARIMA $(1, 1, 1) \times (0, 2, 0)_{12}$ model.

For the three classes of medications we noticed a hoarding effect during the month preceding the implementation of the cost sharing drug plan (July 1996) for individuals receiving social assistance. However, this phenomenon was much more present among users of inhaled corticosteroids than among users of the other two classes of medications. We did not observe this phenomenon for individuals privately insured (control series).

For the 11 months following the implementation of the cost sharing drug plan (August 1996 to June 1997), we observed a statistically significant decrease in the use of inhaled corticosteroids among individuals receiving social assistance (see Fig. 1a). As we can see, all points reflecting the observed consumption of inhaled corticosteroids after the implementation of the cost sharing drug plan fall outside the 95% prediction interval computed around the predicted values. This analysis shows a decrease of 28% for the number of prescriptions of inhaled corticosteroids dispensed from August 1, 1996 to June 1997, as compared with the same period 1 year before. Based on the time series analysis, an increase of 9% was expected. We thus observed, among RAMQ beneficiaries, a net significant decrease of 37%. On the other hand, we did not observe any reduction in the consumption of inhaled corticosteroids after August 1996 among individuals insured by the CCQ (see Fig. 1b).

For neuroleptics and anticonvulsants, we observed a decrease of 1% in the number of prescriptions dispensed during the 11 months following the implementation of the cost sharing drug plan among individuals receiving social assistance, but this decrease was not statistically significant. Based on the time series analysis, increases of 7 and 8% were expected for neuroleptics and anticonvulsants, respectively. We thus observed, among RAMQ beneficiaries, a net non significant decrease of 8 and 9% for neuroleptics
Table 1
Demographic characteristics of subjects receiving social assistance and insured by the RAMQ during the month of July 1996

<table>
<thead>
<tr>
<th>Classes of medications</th>
<th>Inhaled corticosteroids n = 7466&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Neuroleptics n = 11 973&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Anticonvulsants n = 14 188&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years (July 15, 1996)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Mean ± S.D. 38.5 ± 17.9</td>
<td>42.7 ± 10.7</td>
<td>41.5 ± 11.9</td>
</tr>
<tr>
<td>Median</td>
<td>41.7</td>
<td>42.6</td>
<td>41.8</td>
</tr>
<tr>
<td>(%) Male</td>
<td>38.5</td>
<td>53.7</td>
<td>45.0</td>
</tr>
</tbody>
</table>

<sup>a</sup> Age was calculated as of July 15, 1996 for every subject who had at least one prescription of the medications under study dispensed during the month of July 1996.

<sup>b</sup> The sample sizes represent the number of subjects who had at least one prescription of the medications under study dispensed during the month of July 1996.

Fig. 1. (a) Monthly consumption of inhaled corticosteroids among individuals receiving social assistance and covered by the RAMQ for their medications. (b) Monthly consumption of inhaled corticosteroids among individuals insured by a private insurance company for their medications, —, observed values; ---, predicted values; --, 95% prediction interval for the predicted values.
and anticonvulsants, respectively. On the other hand, the consumption of these medications did not decrease after August 1996 among individuals insured by the Commission de la construction du Québec.

4. Discussion

We observed a decrease in the number of prescriptions dispensed to individuals receiving social assistance after the implementation of the cost sharing drug plan in August 1996 for the three classes of medications used to treat chronic diseases. Users of inhaled corticosteroids were the most affected patients with a net significant decrease of 37%. Users of neuroleptics and anticonvulsants were less affected with a net non significant decrease of 8 and 9%, respectively. On the other hand, no decrease in terms of drug consumption was observed after August 1996 for individuals insured by the CCQ.
Other studies have also shown that cost sharing policies can have negative impacts on the consumption of medications that are considered essential, but very few of them have studied specific drug classes [1,8,18,19]. In one study, Reeder and Nelson observed a decrease in the consumption of neuroleptics after introduction of a copayment of 0.50 $ per prescription imposed to the beneficiaries of Medicaid, a low-income population, in the United States [7].

Our data suggest that there is a differential effect of cost sharing policies on drug utilization of individual drugs among low income persons who have the least amount of resources to respond to the new drug policy. This may be explained, at least in part, by the different nature of the medications we studied. Inhaled corticosteroids are efficacious anti-inflammatory medications that are used to control asthma [11]. Nevertheless, their effects may not be felt by the patient before a few
weeks of regular therapy, and their discontinuation is not likely to be accompanied by immediate discomfort [20]. Many weeks may pass before the lungs get back to a level of inflammation similar to what it was when the patient started his therapy with inhaled corticosteroids. The patient may not realize the level of deterioration of his lungs until a serious asthma attack arises, leading to an emergency visit or to a hospitalization, where therapy with inhaled corticosteroids may be re-started.

As opposed to inhaled corticosteroids, discontinuation of therapy with neuroleptics for the treatment of schizophrenia and anticonvulsants for the treatment of epilepsy may be accompanied with discomfort that will be perceived more quickly by the patient. These medications are known to produce therapeutic effects that can be felt by the patient within a few days of the initiation of therapy [21]. Moreover, the discontinuation of these medications, and more so for anticonvulsants, can have immediate and dramatic effects. This may explain, at least in part, why fewer beneficiaries stopped their therapy with neuroleptics and anticonvulsants or re-started their therapy a few days after its discontinuation. Our analysis is not detailed enough to detect interruptions of therapy that lasted only a few days. The cost of medications is another factor that may have influenced the patient’s behavior. Inhaled corticosteroids are generally considered expensive medications; their cost can be as high as 107 Canadian dollars (73 US $) per canister.

Our analysis also showed that there was no decrease in the consumption of the three medications under study among a group of people that were not affected by the cost sharing drug plan. However, we observed a decreasing trend in the use of inhaled corticosteroids among CCQ members before the implementation of the drug plan. This could be explained by a decrease in the total number of persons insured between 1993 and 1996 (66,658 persons in 1993 vs. 56,008 persons in 1996).

Even if the people in the control group who are workers and their family may have had different characteristics than people in the intervention group, the control group helped to discard the possibility of other major health related changes affecting drug consumption occurring at the same time as the implementation of the cost sharing drug plan.

A factor, however, that could have amplified the impact of the cost sharing drug plan is the hoarding effect seen in July 1996. Nevertheless, it is unlikely that this phenomenon significantly influenced the results since the majority of the beneficiaries received a 30 day prescription during that month. In Quebec, pharmacists do not, except under specific conditions, renew a 30 day prescription for a person insured by the RAMQ earlier than 6 days before the end of the prescription (6 days represent 20% of the duration of the 30 day prescription). It is thus unlikely that patients were able to obtain more than one renewal during the month of July 1996. The hoarding effect seen in July 1996 is more likely to be due to earlier renewal of prescriptions rather than dispensation of larger quantities of drugs.

Another factor that could have amplified the observed decrease but for which we had no control is the fact that physicians may have prescribed higher doses and asked the patients to split tablets or use less puffs for inhalers. However, especially for inhaled corticosteroids, higher dosage formulations are much more expensive than lower dosage formulations (e.g. in 1997, a canister of 200 puffs of beclomethasone 0.05 mg per dose was $15.33 and a canister of 200 puffs of beclomethasone 0.25 mg per dose was $71.05). Patients had no real economic advantage in buying higher dosage formulations and use less puffs per day since they had to pay 25% of the cost of the medications. Patients and physicians may be tempted to use higher dose or longer duration of prescription when there is a fixed cost per prescription.

These results should, however, be interpreted with caution due to some methodological weaknesses of our analysis which is based on aggregate data (ecological data) [22]. The analyses that we performed do not provide information on individuals and, therefore, do not differentiate between patients stopping their therapy after the implementation of the cost sharing drug plan and a reduction in the number of new users of the medication under study. Moreover, our analysis did not take into account changes in physician prescribing that may have been prompted by the
new drug plan. For example, due to the economic constraints induced by the drug plan, a physician might have re-evaluated an epileptic patient which was on a combination therapy with three different anticonvulsants and decide to reduce the therapy to two medications without affecting the health of his patient.

We observed a decrease in the consumption of medications that are considered effective and essential after the implementation of a cost sharing drug insurance plan among a low income population. Users of inhaled corticosteroids appeared to be more affected than users of neuroleptics and anticonvulsants. Our analyses reflect only short term results and analyses based on long term data should be performed.

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References


