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Original Research

Self-Monitoring of Blood Glucose Levels: Evaluating the Impact of a Policy of Quantity Limits on Test-Strip Use and Costs

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ABSTRACT

Objectives: To evaluate the impact of new quantity limits for blood glucose test strips (BGTS) in August 2013 on utilization patterns and costs in the elderly population of Ontario, Canada.
Methods: We conducted a population-based, cross-sectional time series analysis of all individuals 65 years of age and older who received publically funded BGTSs between August 1, 2010, and July 31, 2015, in Ontario, Canada. The number of BGTSs dispensed and the associated costs were measured for 4 diabetes therapy subgroups—insulin, hypoglycemia-inducing oral agents, non-hypoglycemia-inducing oral agents, and no drug therapy—each month during the study period. We used interventional autoregressive integrated moving average (ARIMA) models to assess the impact of Ontario's policy change on test strip use and costs.
Results: In the course of the study period, 657,338,177 test strips were dispensed to elderly patients in Ontario, at a total cost of CAN$482.3 million. Introduction of quantity limits was associated with significant reductions in the number of monthly strips dispensed and the associated costs ($p<0.0001$). In the year following the policy's implementation, test strip use decreased by 22.2% compared with the prior year (from 145,232,024 test strips to 113,007,795 test strips, a net decrease of 32,224,229 strips), resulting in a 22.5% reduction in costs (from $106.5 million to $82.6 million, a net cost reduction of approximately $24 million).
Conclusions: The introduction of quantity limits, aligned with guidance from the Canadian Diabetes Association, led to immediate significant reductions in BGTS dispensing and costs. More research is needed to assess the impact of this policy on patient outcomes.

Mots clés :
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RÉSUMÉ

Objectifs : Évaluer les répercussions des nouvelles restrictions quantitatives de bandelettes réactives pour la glycémie (BRG) d'août 2013 sur les tendances et les coûts d'utilisation chez la population âgée de l'Ontario, au Canada.
Méthodes : Nous avons mené une analyse transversale des séries chronologiques de tous les individus de 65 ans et plus qui ont reçu des BRG subventionnées par le gouvernement entre le 1er août 2010 et le 31 juillet 2015, en Ontario, au Canada. Nous avons évalué le nombre de BRG distribuées et les coûts associés de 4 sous-groupes de traitement du diabète—insuline, agents oraux provoquant des hypoglycémies, agents oraux ne provoquant pas d'hypoglycémies et sans pharmacothérapie—tous les mois au cours de la période étudiée. Nous avons utilisé des modèles autorégressifs à moyennes mobiles intégrés (ARMMI) pour évaluer les répercussions des changements de politiques de l'Ontario sur l'utilisation et les coûts des bandelettes réactives.

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Résultats : Au cours de la période étudiée, 657 338 177 bandelettes réactives ont été distribuées aux patients âgés de l'Ontario, soit un coût total de 482.3 M$ CA. La mise en place des restrictions quantitatives était associée à des réductions significatives du nombre mensuel de bandelettes distribuées et des coûts associés (p<0.000 1). Dans l'année qui a suivi la mise en œuvre des politiques, l'utilisation des bandelettes réactives a diminué de 22.2% par rapport à l'année précédente (de 145 232 024 bandelettes réactives à 113 007 795 bandelettes réactives, soit une diminution nette de 32 224 229 bandelettes), ce qui a entraîné une réduction des coûts de 22.5 % (de 106.5 M$ à 82.6 M$, soit une réduction nette approximative des coûts de 24 M$). *Conclusions :* La mise en place des restrictions quantitatives, en conformité avec l'Association canadienne du diabète, a entraîné des réductions significatives immédiates dans la distribution des BRG et des coûts qui y sont associés. D'autres recherches sont nécessaires pour évaluer les répercussions de cette politique sur les résultats cliniques des patients.

Introduction

The optimal use of self-monitoring of blood glucose (SMBG) by people with diabetes is an area of uncertainty, given the need to balance appropriate use affecting patient care and the potential for overuse and unnecessary healthcare costs (1–3). Indeed, a 2009 Canadian review suggested that in individuals with diabetes who do not use insulin, frequent testing may not offer any clinical benefit and may, in fact, cause increased anxiety (4,5). Moreover, the aggregate costs of blood glucose test strips (BGTSs) can represent considerable cost burdens. Between 2010 and 2013, BGTSs were consistently among the top 10 expenditures in the Ontario public drug formulary (6–8). One approach taken by public drug insurers has been the introduction of annual limits on the number of BGTSs reimbursed. The aim of these policies is to provide patients with sufficient test strips for appropriate blood glucose monitoring while reducing the potential for overuse and unnecessary expense. Studies have suggested that the financial implications of such limits are considerable (9,10), with 5-year savings estimated to be approximately $100 million and $23 million in Ontario and British Columbia, Canada, respectively (11).

Following consultation with clinical experts and stakeholders, the Ontario public drug plan introduced quantity limits for BGTSs in August 2013 that aligned with the guidance published by the Canadian Diabetes Association (3,12). The policy limits reimbursement to up to 3000 strips per year for insulin-treated patients, 400 strips per year for those treated with oral hypoglycemic agents (OHAs) that may cause hypoglycemia (such as sulfonylureas), and 200 strips per year for all other individuals with diabetes. Extra test strips are reimbursed if there is a clinical rationale for more frequent testing, such as drug interactions that impact blood glucose control, failing to meet glycemic targets for 3 or more months, or an occupation that requires strict avoidance of hypoglycemia (13).

As other drug insurers consider policy options for addressing the rising costs associated with BGTSs, evaluations of the impact of Ontario's policy on utilization, costs and outcomes are needed. We report the findings of the first phase of an evaluation of Ontario's policy; the study assessed the impact of quantity limits on test strip utilization patterns and costs in Ontario by seniors.

Methods

We conducted a population-based, cross-sectional time series analysis of all individuals 65 years of age and older who received publically funded BGTSs between August 1, 2010, and July 31, 2015, in Ontario, Canada. This study was approved by the Research Ethics Board of Sunnybrook Health Sciences Centre, Toronto.

Cohort definition

We included all individuals 65 years of age and older who were dispensed BGTSs reimbursed by the Ontario Public Drug Program during the study period. Prescriptions were identified using the Ontario Drug Benefit database, which captures all reimbursed medications dispensed at Ontario retail pharmacies to individuals eligible for public drug coverage. Prescriptions with missing patient identifiers or age and those dispensed to individuals younger than 65 were excluded from the analysis.

Outcome definition

Each month, we determined the number of test strips dispensed to eligible patients and the associated public payer costs (product costs and dispensing fees, excluding deductibles). Costs were expressed in nominal Canadian dollars. Furthermore, we created 2 cohorts of patients using BGTSs in the year prior to (July 1, 2012, to June 30, 2013) and following (August 1, 2013, to July 31, 2014) the implementation of Ontario's policy to compare patterns of utilization and costs in the prepolicy and postpolicy periods. We excluded the month immediately prior to implementation of the policy (July 2013) because of anomalous dispensing patterns suggestive of stockpiling by patients in anticipation of the policy. We allocated patients to 1 of 4 hierarchic and mutually exclusive groups on the basis of the diabetes treatment received in each period, as follows: those treated with insulin; those receiving hypoglycemia-inducing oral glucose-lowering drugs (sulfonylureas or repaglinide); those receiving non-hypoglycemia-inducing glucose-lowering drugs; and those not receiving diabetes medications. The total number of test strips dispensed, the average number of test strips dispensed per patient, and the proportion of individuals exceeding the Ontario quantity limits were identified and stratified by cohort (prepolicy vs. postpolicy) and diabetes therapy group. Finally, to assess whether patients were being prescribed insulin in order to access higher BGTS quantity limits, we identified the total number of new insulin users in the year prior to and following the policy's implementation, as well as the number of new insulin users who received only 1 prescription for insulin in each time period.

Patients' characteristics

We used the Registered Persons Database to obtain demographic characteristics of individuals dispensed BGTSs in the 1 year prior to and following the policy's implementation. The Canadian Institute for Health Information's Discharge Abstract Database was used to determine each individual's Charlson comorbidity index using hospitalization data over the past 3 years.

Statistical analysis

We used a Winters additive smoothing model to forecast BGTS utilization patterns over our 2-year follow up based on trends observed in the 3 years prior to the policy's implementation (excluding July 2013 due to observed stockpiling). We used interventional autoregressive integrated moving average models to examine the impact of Ontario's quantity-limit policy (August 2013) on the