Can J Diabetes xxx (2017) 1–6

Contents lists available at ScienceDirect

Canadian Journal of Diabetes

journal homepage: www.canadianjournalofdiabetes.com

Self-Monitoring Blood Glucose Test Strip Utilization in Saskatchewan: A Retrospective Study

Lynette Kosar MSc [a], Wasem Alsabbagh PhD [b], Xinya Lu PhD [c], Lisa M. Lix PhD [d], Yvonne Shevchuk PharmD [a], Gary F. Teare PhD [c], Anne Champagne BSP [e], David F. Blackburn PharmD [a,*]

[a] College of Pharmacy and Nutrition, University of Saskatchewan, Saskatoon, Saskatchewan, Canada
[b] School of Pharmacy, University of Waterloo, Waterloo, Ontario, Canada
[c] Health Quality Council, Saskatoon, Saskatchewan, Canada
[d] Department of Community Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada
[e] Drug Plan and Extended Benefits Branch, Saskatchewan Ministry of Health, Regina, Saskatchewan, Canada

ARTICLE INFO

Article history:
Received 15 December 2016
Received in revised form
9 January 2017
Accepted 9 January 2017

Keywords:
blood glucose test strips
diabetes
drug utilization
self-monitoring blood glucose test strips

ABSTRACT

Objectives: To describe trends in blood glucose test strip (TS) utilization and cost in Saskatchewan.
Methods: A retrospective analysis of TS use between January 1, 1996, and December 31, 2013, was conducted using population-based health administrative databases in Saskatchewan. The prescription drug database was used to describe the annual number of TS dispensations, the number of strips dispensed, the number of unique beneficiaries and the total costs. A patient-level analysis was also carried out to describe the patterns of TS use (i.e. light, moderate or heavy) by the entire cohort and by diabetes treatments. Potential cost savings due to a newly implemented restriction policy were estimated based on the most recent data (2013).
Results: TS utilization increased dramatically between 1996 and 2013 in terms of the number of users and the average number of TSs received. The percentage of TS users receiving fewer than 4 TSs per week (i.e. light users) decreased by 20%, while the percentage of heavy users (i.e. those receiving more than 8 TSs per week) increased by 19%. During the same period, the use of high-risk oral hypoglycemic medications declined by 30% among all TS users. Heavy TS use was observed in at least one-third of all users, irrespective of treatment type.
Conclusions: If Saskatchewan's newly imposed coverage limits had been applied in 2013, the costs of strips exceeding those limits would have totalled $2.5 million. Although TS use aligns with chronic disease care paradigms, the substantial costs and lack of evidence of patient outcomes demand better strategies to help reduce unnecessary use.

Mots clés :
bandelettes de test glycémique
diabète
utilisation de médicaments
bandelettes réactives pour l'autosurveillance glycémique

RÉSUMÉ

Objectifs : Décrire les tendances touchant l'utilisation et le coût des bandelettes de test glycémique (BTG) en Saskatchewan.
Méthodologie : Une analyse rétrospective portant sur l'utilisation des BTG entre le 1er janvier 1996 et le 31 décembre 2013 a été effectuée à partir de bases de données administratives sur la santé fondées sur la population en Saskatchewan. La base de données sur les médicaments d'ordonnance a servi à décrire le nombre annuel de délivrances de BTG, le nombre de bandelettes délivrées, le nombre de bénéficiaires uniques et les coûts totaux. Une analyse des données sur les patients a également été effectuée pour caractériser l'utilisation des BTG (à savoir faible, modérée ou forte) dans l'ensemble de la cohorte et par traitements du diabète. Les économies de coûts potentielles attribuables à une politique de restriction récemment mise en œuvre ont été estimées à partir des données les plus récentes (2013).

* Address for correspondence: David F. Blackburn, PharmD, College of Pharmacy and Nutrition, University of Saskatchewan, 104 Clinic Place, Saskatoon, Saskatchewan, S7N 2Z4, Canada.
E-mail address: d.blackburn@usask.ca

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http://dx.doi.org/10.1016/j.jcjd.2017.01.004

Résultats : L'utilisation de BTG a augmenté de façon spectaculaire entre 1996 et 2013 pour ce qui est du nombre d'utilisateurs et du nombre moyen de BTG reçues. La proportion d'utilisateurs recevant moins de quatre BTG par semaine (ce qui correspond à une faible utilisation) a diminué de 20 %, tandis que la proportion d'utilisateurs recevant plus de 8 BTG par semaine (ce qui correspond à une forte utilisation) a augmenté de 19 %. Au cours de la même période, l'utilisation d'hypoglycémiants oraux associés à un haut risque d'hypoglycémie a diminué de 30 % parmi tous les utilisateurs de BTG. Une forte utilisation a été relevée chez au moins le tiers de tous les utilisateurs, indépendamment du type de traitement.
Conclusions : Si les limites de remboursement récemment imposées en Saskatchewan avaient été appliquées en 2013, les coûts des bandelettes dépassant ces limites auraient totalisé 2,5 M$. Bien que l'utilisation de BTG concorde avec les paradigmes de prise en charge des maladies chroniques, les coûts élevés et le manque de données probantes sur les résultats cliniques appellent de meilleures stratégies visant à réduire l'utilisation non essentielle de ces produits.

Introduction

Self-monitoring of blood glucose (SMBG) has become a mainstay of diabetes management; it represents an easily accessible tool to engage patients in their own care. Indeed, self-care is a key strategy that is expected to improve health outcomes in patients with chronic diseases (1). However, the benefits of SMBG have been demonstrated only in certain subpopulations of diabetes patients such as insulin users (2–10). In fact, SMBG may not have any clinically important benefits in patients managed without insulin, who represent a very high percentage of the overall population with diabetes (2–10).

In Canada, approximately half of all blood glucose test strip (TS) dispensations are obtained by non-insulin users (11–13). Furthermore, 19% to 26% are dispensed to patients who do not use diabetes medications at all (11–13). Although the potential unnecessary use is not expected to cause patient harm, it does come at a high cost. In 2006, 8 publicly funded drug plans across Canada spent $250 million on TSs, while privately funded drug plans spent over $120 million (11). That same year, approximately $11 million were spent on TSs in Saskatchewan, of which $5.8 million were covered by the government.

Several drug plans in Canada have attempted to encourage more appropriate use of TSs by applying restrictions to TS reimbursement (14–17). In Saskatchewan, as of October 2015, beneficiaries who use insulin received coverage for a maximum of 3650 TSs per year, while those on insulin secretagogues (medications with high risk for causing hypoglycemia, such as sulfonylureas) are covered for 400 strips per year (18). An annual maximum of 200 TSs are allotted for individuals on other antihyperglycemics or managed through diet or lifestyle therapy (18). Beneficiaries can purchase TSs above these limits, but the cost of additional strips is not reimbursed by the drug plan unless certain clinical criteria are met. Prior to the implementation of restrictions in Saskatchewan, all beneficiaries with or without diabetes were allowed a maximum of 900 TSs per 90 days (i.e. 3650 TSs per year) (14). The purpose of this study was to characterize the growth of TS utilization and cost in Saskatchewan prior to the implementation of a restriction policy (i.e. between 1996 and 2013). At the time of data analysis, data were available through December 2013. After the new policy was implemented in 2015, we subsequently estimated the potential cost savings that may have been realized after implementation.

Methods

We conducted a retrospective analysis of TS utilization in Saskatchewan between January 1, 1996, and December 31, 2013. The Ministry of Health in Saskatchewan maintains a prescription database that captures dispensations to beneficiaries for medications (and TSs) that are listed in an extensive formulary (i.e. all medications that are covered by the provincial drug plan). More than 90% of the provincial population are beneficiaries of the drug plan and TSs, along with other diabetes supplies, such as syringes, needles, lancets and swabs, are eligible for reimbursement. Each beneficiary has a unique identification number that allows linkage to other health service databases, such as the person registry, vital statistics and hospital and physician services claims (19).

Aggregate utilization and cost

Overall TS utilization was measured annually between 1996 and 2013 with the following endpoints: 1) crude number of TS dispensations; 2) crude number of strips dispensed; 3) crude number of unique beneficiaries with at least 1 TS dispensation; 4) crude number of TSs per user; 5) crude cost of TSs (total and government share, including dispensing fees and markup) dispensed to all Saskatchewan beneficiaries and 6) crude government cost per TS user. Strip use was age- and sex-standardized to the 2005 population of active beneficiaries (i.e. had a full year of provincial health benefits preceding their earliest TS dispensation) to allow for valid comparisons over time. Least squares regression was used to test the average annual change over time for each endpoint.

Patient-level patterns of test strip use

All beneficiaries receiving at least 1 TS dispensation were followed from their earliest TS dispensation in each calendar year until the earliest occurrence of December 31 of the specific year, loss of beneficiary status or death. The crude number of strips obtained during each year was divided by the number of days available for follow up after the first TS dispensation. The results were converted into a weekly count and categorized as follows: 1) light TS users (≤1 to 4 TSs per week); 2) moderate TS users (5 to 8 TSs per week) and 3) heavy TS users (>8 TSs per week). In a sensitivity analysis, individuals with only a single dispensation for TSs were automatically categorized as light users if the date of the dispensation occurred in the month of December.

TS users were further classified into 1 of 4 mutually exclusive groups based on their diabetes prescription drug use in each specific year: 1) insulin user (± antihyperglycemic medications); 2) insulin secretagogue user; 3) other antihyperglycemic medication user or 4) no antihyperglycemic use (Table 1). For individuals with no dispensations for antihyperglycemic agents in a given calendar year, a sensitivity analysis was performed by expanding the screening period to 3 years (i.e. 1 year before and 1 year after the year of interest). Strip use (i.e. high, moderate, low) was presented for the overall cohort and also within each drug-use category (Table 1). Insulin users were further stratified by their relative dosage, estimated by the mean daily average consumption (20). Daily average consumption was calculated by adding all insulin units received from the earliest dispensation to the second-last insulin dispensation in each calendar year and dividing by the total days between the first and last dispensations. If an individual had only 1 insulin