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Original Research

## Use of Diabetes Registry Data for Comparing Indices of Diabetes Management: A Comparison of 2 Urban Sites in Canada and Colombia



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### ABSTRACT

**Objectives:** To demonstrate the use of a multinational diabetes registry for comparing indices of diabetes management among countries with differing levels of income, healthcare systems and ethnic backgrounds.

**Methods:** A cross-sectional study was conducted among 1742 people with type 2 diabetes attending diabetes clinics in London, Ontario, Canada, and Bogota, Colombia. The data were extracted from the Global Registry and Surveillance System for Diabetes (GRAND).

**Results:** Canadian patients were diagnosed with diabetes at significantly younger ages than Colombian patients (49 years and 53 years, respectively) and were heavier (body mass indices of 33 and 28, respectively). The Colombian patient population had significantly higher mean glycated hemoglobin (A1C) levels (9.4% vs. 8.6%) and fewer patients (22% vs. 26%) at the glycemic target (A1C <7.0%) than Canadian patients. In Colombia, 1 or more diabetes-related complications were present in 51% of the study population compared with 37% in Canada. Newly diagnosed Colombians had higher mean A1C levels (9.1% vs. 8.7%) and low-density lipoprotein-C levels (3.3 mmol/L vs. 2.5 mmol/L) than did newly diagnosed Canadians.

**Conclusions:** A multinational diabetes registry collecting standardized data facilitates transnational comparison of diabetes clinical parameters for the purpose of identifying potential gaps in care.

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### R É S U M É

**Objectifs :** Dresser l'utilisation d'un registre du diabète multinational pour la comparaison d'indicateurs de gestion du diabète pour des pays avec différents niveaux de revenus, systèmes de santé et origines ethniques.

**Méthodes :** Une étude transversale a été menée auprès de 1742 personnes atteintes de diabète de type 2 qui fréquentent des cliniques de diabète à London, Ontario, Canada, et Bogota, en Colombie. Les données ont été extraites du Registre Mondial et Système de Surveillance du Diabète (GRAND).

**Résultats :** Les patients canadiens ont été diagnostiqués avec un diabète à un âge significativement plus jeune que les patients colombiens (49 ans et 53 ans, respectivement) et étaient plus lourds (indices de masse corporelle de 33 et 28, respectivement). La population de patients colombiens avait des niveaux moyens d'hémoglobine glyquée (A1C) significativement plus élevés (9,4% vs 8,6%) et avait moins de patients à la valeur cible glycémique (A1C <7,0%) que les patients canadiens (22% contre 26%). En Colombie, une ou plusieurs complications liées au diabète étaient présentes dans 51% de la population de l'étude comparativement à 37% au Canada. Les colombiens nouvellement diagnostiqués avaient des taux moyens d'A1C élevés (9,1% vs 8,7%) et des niveaux élevés de lipoprotéines-C de basse densité (3,3 mmol/L vs 2,5 mmol/L) par rapport aux canadiens nouvellement diagnostiqués.

#### Mots Clés :

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*Conclusions* : Un registre du diabète multinational collectant des données normalisées facilite les comparaisons transnationales des paramètres cliniques du diabète dans le but d'identifier les éventuels manquements dans les soins.

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## Introduction

Diabetes is currently a major global health challenge. More than 382 million people currently have the disease, and predictions note an increase to 592 million by 2035 (1–3). The epidemic is taking place in all countries, but nearly 80% of the burden occurs in low- and middle-income countries (LMICs). Both the International Diabetes Federation (IDF) and the World Health Organization recommend the use of registries to collect standardized variables as a key strategy in responding to the growing epidemic of diabetes and to reduce the costs of prevention and treatment of the disease (3,4). The application of diabetes registries has been localized in scope and their use has been limited, for the most part, to monitoring the health and management of individuals with diabetes (5–7). However, registries can also provide valuable opportunities for cross-national comparisons, benchmarking, best practices and alternative treatments by collecting data from multiple countries and regions in a consistent manner. Knowledge gained from cross-national comparisons of registry data has the potential to inform health policy and highlight areas that need improvement. Only a few studies have used diabetes registries for the purpose of cross-national comparison of clinical parameters (8–12).

The prevalence of diabetes and the mortality and morbidity rates in LMICs is staggering. Healthcare systems in these countries are struggling to address this escalating public health challenge. Registry-based cross-country comparison of diabetes data provides valuable insight into how and to what extent the burden and clinical management of diabetes in LMICs differ from those in high-income countries.

In this article, we present data collected from recently established diabetes registries in 2 urban sites, 1 in Canada and 1 in Colombia. Demographic characteristics and process measures reflecting clinical practices and treatment types for individuals with type 2 diabetes were compared. The 2 sites, located in Canada and Colombia, are early adopters of the Global Registry and Surveillance System for Diabetes (GRAND) that was established in 2013. GRAND is a web-based, centralized database designed to track individuals with diabetes and monitor their clinical information over time. GRAND allows sites from different locations across the world to develop their own diabetes registry on a centralized, secured server. The GRAND system was designed to be used worldwide by various countries, using the data centralization concept, in which data are stored in a single, secure central database server. The centralized data are hosted by the Lawson Health Research Institute, London, Ontario, Canada, and each participating site in various countries has secure access to its own site portal, where it can access and manage its own patients' records. The purpose of this article is to demonstrate the use of a multinational diabetes registry for comparing indices of diabetes management among countries with differing levels of income, healthcare systems and ethnic backgrounds.

The prevalence of diabetes in Canada and Colombia was estimated to be 10.21% and 7.12%, respectively in 2013 (3). Canada's publicly funded healthcare system is an interlocking set of health insurance plans handled by individual provinces and territories. The system provides access to universal, comprehensive coverage for medically necessary hospital and physician services. Primary healthcare services are provided predominantly by family

physicians or general practitioners. These services include prevention and treatment of common diseases and injuries, basic emergency services, health promotion, and referrals to and coordination with other levels of care, such as hospital and specialist care. Secondary healthcare services are provided in the home or community and in specialized medical facilities. Referrals to secondary healthcare services can be made by doctors, hospitals, community agencies, families and patients themselves.

Colombia implemented a major healthcare reform in 1993 that introduced mandatory health insurance in response to the challenges of health inequalities and growth in the population without healthcare coverage that the country has faced since the late 1980s. The reform consisted of 2 insurance systems, contributive and subsidized, whereby citizens were assigned to either of them on the basis of their income levels (13,14). According to government data, 20% of the Colombian population still does not have health insurance and, hence, no access to health services (13).

## Methods

Data used for this cross-sectional, comparative study were extracted from GRAND, which was implemented in the Asociación Colombiana de Diabetes (ACD) referral clinic in Bogotá, Colombia, in 2013. ACD, where this project was conducted in Colombia, is a nonprofit organization founded to deliver comprehensive diabetes care to people with diabetes in Colombia, particularly to those with fewer economic resources. Patients come to ACD when they feel that the care provided to them at their primary care unit is insufficient and, therefore, seek a different opinion from a speciality care unit. Patients with chronic complications get referred to ACD. The ACD foot clinic is a national referral centre where people with diabetes go when they have diabetes-related foot problems and are looking for specialized care. So far, demographic and clinical information for more than 970 adult individuals (age  $\geq 18$  years) with type 2 diabetes who made initial visits to the clinic in 2012 has been entered into the GRAND system based on patient paper charts and retrospective chart reviews.

The Canadian study site is the primary regional centre for diabetes management in southwestern Ontario and provides diabetes care, support and education for individuals diagnosed with diabetes, who are dealing with various challenges that make managing diabetes more difficult, such as poverty, language barriers, social isolation, addictions or mental illness. The program also provides diabetes care to individuals without family doctors. GRAND was populated with Canadian data from a researchable database linked to a diabetes-specific electronic medical record named Web DR, which is an electronic medical record (EMR) with clinician-friendly pick-lists to enable structured EMR data collection at the point of care, and it is currently being used by 10 endocrinologists and 3 family physician diabetologists in the outpatient diabetes referral clinics at St. Joseph's Health Care in London, Ontario, Canada. Web DR automatically feeds the de-identified researchable database with new records and updates on a nightly basis.

All clinical values, including weight, height, blood pressure, glycated hemoglobin (A1C), lipid profile, renal function (eGFR), self-reported and physician-verified complications and medication information used for this analysis and presented in this article were entered into GRAND from either patient paper charts (Colombia) or

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