

Diabetes complexities drive resource consumption in Canada

According to the OECD, Canada currently ranks 27 out of 34 member countries in the number of physicians per 1,000 persons.¹ Around 15% of Canadians report either being unable to access a primary care doctor or choosing not to do so.² A new IMS Health analysis of EMR data reveals diabetes as the main consumer of GP resource among chronic conditions in Canada, with key insights for improvement initiatives.



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A case study of EMR data in diabetes

LEVERAGING REAL-WORLD EVIDENCE

Findings from the 2013 National Physician Survey in Canada indicate that 64% of family physicians and 59% of specialists now utilize electronic medical records (EMR) in their practices.³ The improved availability of EMR data makes it a powerful source of real-world evidence to better understand demands on the healthcare system. In seeking to evaluate primary care utilization in the country, a study was conducted using Canadian data from the IMS Evidence 360 EMR database. This provided access to a panel of around 500 general practitioners (GPs) and specialists covering more than 500,000 anonymous patients as a sample of the Canadian population in major chronic indications.

Objectives

The cross-sectional EMR study had three key objectives

1. Identify medical conditions that are the highest consumers of physicians' time in Canada, measured in visits per patient per year
2. Describe the contributing factors for the medical condition associated with the most frequent visits per patient per year
3. Propose areas of high potential impact for further investigation and intervention

Methodology

A cohort of all patients with at least one physician visit recorded during the study period of June 2013–May 2014 was extracted from the EMR dataset. The overall concentration of patient visits and average visits per patient was then determined across different diagnosed conditions. These conditions were prioritized based on the average visits per patient, and statistical significance calculated to identify the top consumer of physicians' time for both the acute and chronic conditions.

TABLE 1A: CHRONIC CONDITIONS

Medical Condition	Patients	Visits	Visits per patient	p-value*
Diabetes mellitus	2765	7205	2.61	<0.001
Mental health disorders	5901	11425	1.94	<0.001
Hypertension & other heart diseases	4764	8270	1.74	0.066
Chronic musculoskeletal system & connective tissue disorders	9263	13906	1.50	<0.001
Chronic diseases of the respiratory system	3970	5319	1.34	

TABLE 1B: ACUTE CONDITIONS

Medical Condition	Patients	Visits	Visits per patient	p-value*
Acute diseases of the respiratory system	15706	25083	1.60	<0.001
Diseases of the urinary system (cystitis)	5155	6609	1.28	0.92
Family planning, contraceptive advice, advice on sterilization or abortion	3820	4844	1.27	<0.001
Immunization (all types)	4702	5627	1.20	0.31
Acute musculoskeletal system & connective tissue disorders	1970	2354	1.19	<0.001
Diarrhea, gastroenteritis, viral gastroenteritis	2205	2522	1.14	

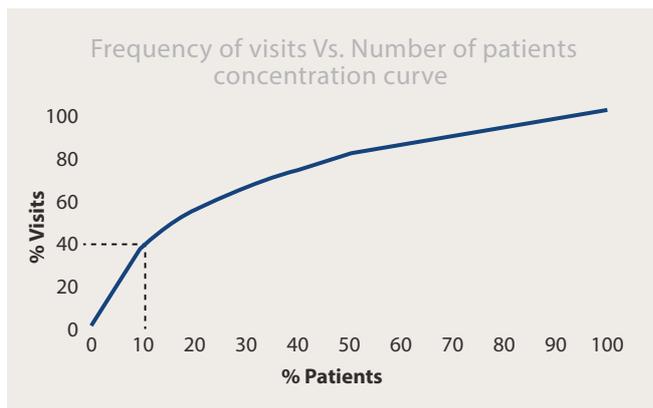
Note: ICD-9 Code 078 containing other diseases due to virus was excluded due to potential for multiple viral infections to be captured under this single code

STUDY FINDINGS

Primary care system utilization overview

In the study period, a total of 122,296 unique patients recorded visits to physicians in the EMR database. The concentration of visits showed that 10% of patients were responsible for nearly 40% of primary care visits (Figure 1).

FIGURE 1: 10% OF PATIENTS ACCOUNTED FOR 40% OF PRIMARY CARE VISITS



Among the patients with chronic conditions, those with diabetes made more repeat visits to a physician, as indicated by the significantly higher average number of visits per patient (2.6 per year) compared to other chronic diseases (Table 1A). Among the acute conditions (which were not studied further), patients with diseases of the respiratory system had the highest average number of visits per year (1.6 per patient) over the study period (Table 1B). The further analysis focused on diabetes given its chronic status and the significantly larger portion of year-to-year healthcare spending on this condition.

*p-value for the Wilcoxon rank sum test measures the significance of the difference in visits/patient between each medical condition and the next highest medical condition

Resource use contributors in diabetes

To determine potential contributors to the high level of resource use in diabetes, data on its associated demographics, co-morbidities/concomitances and lab tests was extracted and analyzed. All diabetic patients were identified in the cohort on the basis of having at least one ICD-9 diagnosis code 250 or at least one prescription for an anti-diabetic described by the ATC code A10.

Body Mass Index (BMI), HbA1c and fasting glucose levels were analyzed for the diabetic cohorts based on the latest available result within the study period. Patients with fasting glucose >6.9 mmol/L or HbA1c >7% were further segmented as 'out of control'. Those treated with a metformin product alone for the entire study period and those who received metformin plus another anti-diabetic class in the study period were also segmented. Statistical tests were conducted to determine if observed differences between patient segments were statistically significant.

Patients

A total of 4,390 diabetic patients recorded physician visits in the EMR dataset over the study period. More males (55%) than females (45%) were observed among these patients, which is representative of the Canadian diabetic population (54% males vs. 46% females).⁴ The majority (73%) were over 50 years of age (Figure 2). Of the 1,697 patients with measurable BMI, more than 50% were classified as obese (BMI >30.00) and another 30% as overweight (BMI 25.00–29.99) (Figure 3).

More than 70% of patients were treated with metformin. However, multiple classes of anti-diabetic medications were used to manage the disease, with DPP-IV inhibitors and sulphonylureas being the next two most frequently prescribed (Table 2). Diabetic patients were also likely to be taking medications for cholesterol and triglyceride control as well as for hypertension or other cardiovascular conditions (Table 3). The type and prevalence of concomitances were consistent with an older and mostly overweight patient population.

Of patients whose med lab test results were available and who had been treated with an anti-diabetic, distribution analysis of their most recent HbA1c and fasting glucose levels (Figure 4) showed that 51% did not meet the HbA1c control threshold and 60% were out of control based on the fasting glucose threshold.

Patients on metformin alone were compared with those who had metformin plus at least one other anti-diabetic in the study period. There was a statistically significant relationship between the medication regimen (metformin vs. metformin plus other) and achieved control state (in control vs. out of control) within the study period (Table 4). Fasting glucose and HbA1c levels were significantly higher for patients treated with metformin and another anti-diabetic in the study period. These patients also had a significantly higher number of GP visits (Table 5). However, further studies are required to determine the link between the medications prescribed and control of diabetes.

FIGURE 2: AGE DISTRIBUTION OF DIABETIC PATIENTS (N=4390)

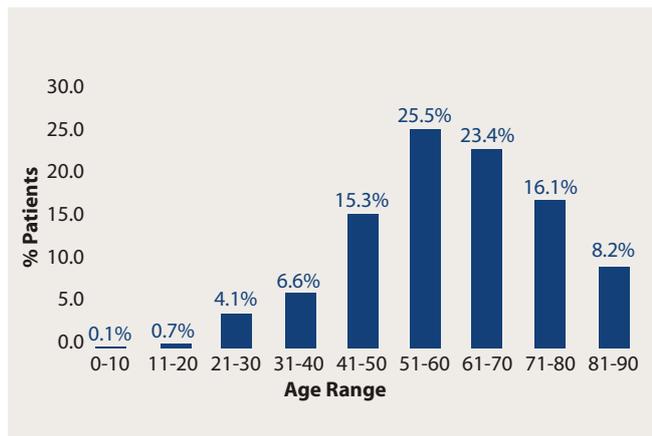
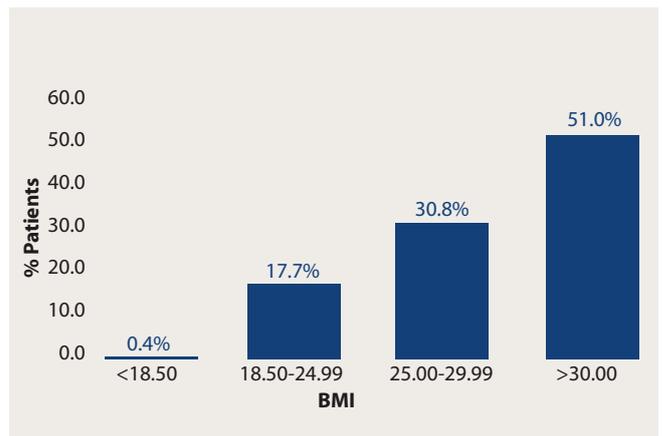


FIGURE 3: BMI DISTRIBUTION OF DIABETIC PATIENTS (N=1697)



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“ The findings of the study utilizing EMR data identify diabetes as the primary consumer of GP resource among chronic conditions in Canada. ”

TABLE 2: DIABETES TREATMENT LANDSCAPE

Type	Class	No. of Patients	% Patients
Anti-diabetic	Metformin	1514	72.3%
	DPP-IV Inhibitor	624	29.8%
	Sulphonylurea	619	29.6%
	Human insulins and analogues	212	10.1%
	Other anti-diabetics	135	6.4%
	Total treated patients	2094	100.0%

Note: Patients treated with multiple product classes would be counted multiple times, once within each row corresponding to each product class prescribed

TABLE 3: TOP DIABETES CONCOMITANCES

Indication	Treatment type	No. of Patients	% Patients
Anti-hyperlipidemia	Cholesterol & triglyceride regulating preparations	1500	34.1%
Cardiovascular	Ace inhibitors	743	16.9%
Gastrointestinal	Antiulcerants	525	11.9%
Cardiovascular	Calcium antagonists	478	10.9%
Cardiovascular	Angiotensin II antagonists	459	10.4%
Cardiovascular	Beta blocker agents	446	10.1%
Cardiovascular	Diuretics	413	9.4%

FIGURE 4: DISTRIBUTION OF DIABETIC PATIENTS BY HBA1C AND FASTING GLUCOSE LEVEL

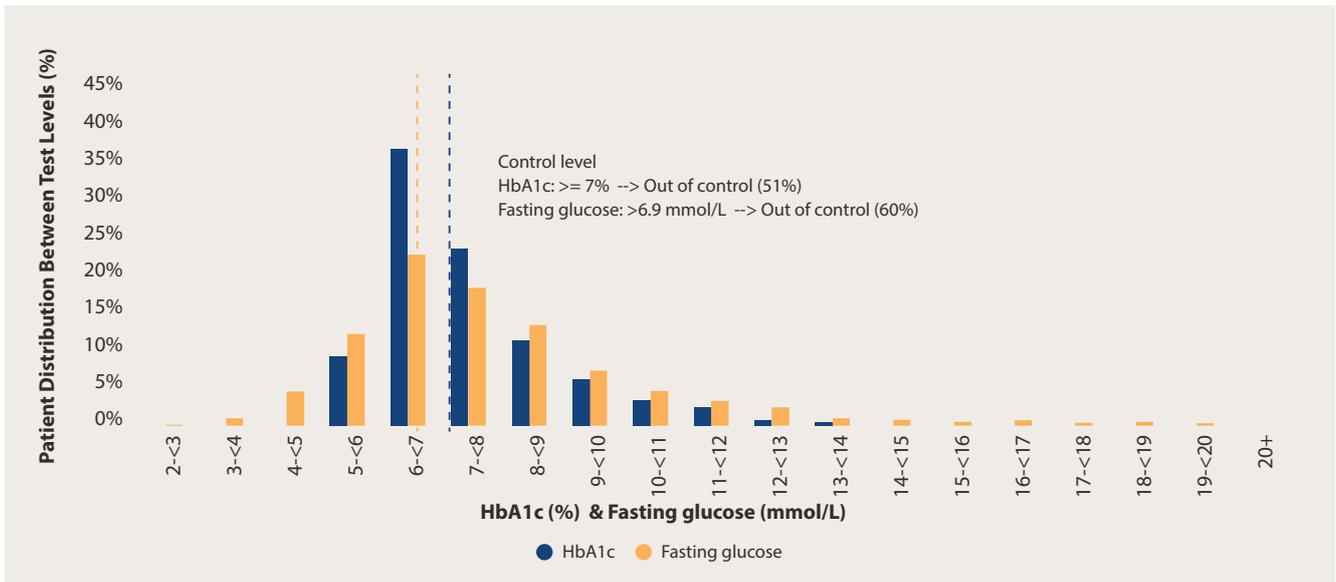


TABLE 4: PEARSON CHI-SQUARED TESTS FOR INDEPENDENCE BETWEEN TREATMENT TYPE AND CLINICAL OUTCOMES BY FASTING GLUCOSE AND HBA1C TEST RESULTS

Fasting glucose level			
	Metformin	Metformin plus other*	Total
In control	213	89	302
Out of control	148	204	352
Total	361	293	654
p-value	<0.001		
HbA1c			
	Metformin	Metformin plus other*	Total
In control	289	120	409
Out of control	134	238	372
Total	423	358	781
p-value	<0.001		

TABLE 5: NON-PARAMETRIC TESTS FOR SIGNIFICANT DIFFERENCE IN OUTCOMES (MEASURED BY FASTING GLUCOSE AND HBA1C TEST RESULTS) AND VISITS TO A PHYSICIAN

	Metformin	Metformin plus other*	p-value
Fasting glucose (mmol/L)	7.08	8.59	<0.001
HbA1c (%)	6.88	7.96	<0.001
Visits	2.46	3.42	<0.001

*Refers to a treatment with metformin in combination with any other anti-diabetic in the study period

IMPLICATIONS FOR FUTURE INTERVENTIONS

It has been estimated that by 2020 around 10.8% of the Canadian population will be diagnosed with diabetes, a 57% increase over a 10-year period. In addition, 22.6% of the population will be classified as pre-diabetic and at risk of developing diabetes in the future.⁵ This could significantly increase the financial burden to Canadian healthcare; direct medical costs are projected to reach CN\$3.8 billion by 2020 (37% growth since 2010), with about 5% attributed to GP and specialist visits.⁵

The findings of the study utilizing EMR data identify diabetes as the primary consumer of GP resource among chronic conditions in Canada. With 80% of diabetic patients classified as being either overweight or obese there is a clear need for weight management programs and lifestyle counseling.

Many diabetics are also often treated for co-morbidities with antihypertensive, gastrointestinal or hyperlipidemia medications. This is indicative of a more complex patient, leading to greater demands on a primary care physician in managing these interrelated conditions.

Despite the availability of multiple treatment choices, more than half of the diabetic patients in the study cohort failed to achieve control of their most recent HbA1c levels. Although the study was not designed to evaluate the drivers of diabetes control, further investigation into

the real-world effectiveness of various therapies is encouraged. The results could potentially inform treatment choices, resulting in a more efficient allocation of resources.

A further observation from the study is that treatment complexity, as indicated by a drug regimen including metformin plus other, is associated with poorer HbA1c/glucose-level control and an increased demand for physician time. Thus, patients who were unable to achieve target control and required more complex treatment regimens consumed a higher number of primary care visits. This implies that maintaining better control of patients during earlier treatment phases can reduce the additional resource required for more advanced diabetes care.

Finally, the study findings point to four key areas with high potential impact for intervention to improve the real-world management of diabetes in primary care

1. Controlling weight
2. Efficiently managing the challenges of treating a patient for multiple conditions
3. Evaluating and identifying the most appropriate and effective medications per patient
4. Achieving and maintaining effective early control of diabetes.

“ The study findings point to four key areas with high potential impact to improve the management of diabetes in primary care. ”

¹ OECD Health Statistics 2014 : How does Canada compare? Available at: <http://www.oecd.org/els/health-systems/Briefing-Note-CANADA-2014.pdf>. Accessed 6 October, 2014

² Statistics Canada, Community Health Survey 2012. Available at <http://www.statcan.gc.ca/pub/82-625-x/2013001/article/11832-eng.htm>. Accessed 6 October, 2014

³ 2013 National Physician Survey. The College of Family Physicians of Canada, Canadian Medical Association, The Royal College of Physicians and Surgeons of Canada. Available at: <http://nationalphysiciansurvey.ca/wp-content/uploads/2013/10/2013-National-ENr.pdf>. Accessed 6 October, 2014

⁴ Statistics Canada. Data for 2013. Available at: <http://www.statcan.gc.ca/tables-tableaux/sum-som/I01/cst01/health53a-eng.htm>. Accessed 6 October 2014

⁵ Canadian Diabetes Association, Diabetes Québec, 2011. Diabetes: Canada at the tipping point. Charting a new path. Available at: <http://www.diabetes.ca/CDA/media/documents/publications-and-newsletters/advocacy-reports/canada-at-the-tipping-point-english.pdf>. Accessed 6 October 2014