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Brief Report

Spending on Hepatitis C Antivirals in the United States and Canada, 2014 to 2018

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ABSTRACT

Objectives: Hepatitis C virus (HCV) antivirals have been shown to be highly effective with minimal adverse effects, but they are costly. Little is known about the national spending on this drug class in either Canada or the United States, 2 countries with different drug pricing regulations. Thus the objective of this study was to compare drug expenditure on HCV medications in the United States and Canada.

Methods: This was a retrospective cross-sectional study using the IQVIA National Sales Perspectives (United States) and Geographic Prescription Monitor (Canada) databases, which contains prescription transactions from American and Canadian pharmacies. All prescription claims for the period between January 1, 2014, and June 30, 2018, were used to describe HCV antiviral expenditure in both countries.

Results: The United States and Canada spent $59.7 billion and $2.8 billion on HCV medications, respectively. Population-adjusted HCV medication costs were higher in the United States ($1 million per 100 000 population) compared with Canada ($0.4 million per 100 000 population).

Conclusions: Although the rates of HCV infection are similar in the 2 countries, these findings highlight the differences in both the reimbursement utilization policy for HCV treatments in the countries and the major differences in drug pricing policies. As policies to reduce drug spending in the United States are explored, this article highlights the potential cost implications of implementing Canadian index pricing.

Keywords: antiviral, expenditures, health policy, hepatitis C.

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Introduction

It is estimated that 71 million individuals have a hepatitis C virus (HCV) infection worldwide.[1] This is significant because HCV infection is a major cause of viral hepatitis,[2] which is the leading cause of life-years lost from an infectious disease. It is estimated that HCV results in an 8- to 12-year reduction in overall life expectancy in infected individuals.[3,4] Transmission most often occurs through percutaneous exposure, such as healthcare-related injections and injection drug use.[5] In the United States and Canada, the prevalence of chronic HCV ranges between 1.1% and 1.3%.[6] Without treatment, chronic hepatitis can lead to complications such as cirrhosis and hepatocellular carcinoma.[7-9]

In 2011, a new class of drugs, direct-acting antiviral (DAA) agents, were approved by the US Food and Drug Administration (FDA) for the treatment of HCV.[10,11] These oral regimens are curative in most patients. Despite the effectiveness of these drugs, their high cost has been an important element affecting how they have been used, with a single pill costing nearly $1000 and a treatment course generally costing $80 000 to $100 000 (Table 1).[12-14] As a result of these high costs, drugs for the treatment of HCV accounted for the second- and fourth-highest proportion of public drug spending in 2017 for Canada and the United States, respectively.[15,16] The combination of high medication prices and the large number of people requiring treatment is a major concern to the healthcare system, yet the national spending on this drug class is not known in either Canada or the United States, 2 countries with differing drug reimbursement processes and policies and different drug pricing regulations. Thus we examined how these differences impacted the spending on, and use of, these high-cost medications. The objective of this study was to compare drug expenditures on HCV medications in the United States and Canada.

Methods

We conducted a retrospective, cross-sectional study of all HCV medications dispensed to outpatients in the United States and

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Canada between January 1, 2014 and June 30, 2018, using data from IQVIA's National Sales Perspectives (NSP) database (US expenditure data) and Geographic Prescription Monitor (GPM) database (Canadian expenditure data). The individual DAAs examined are listed in Table 1.

IQVIA's NSP databases only include aggregate prescription volumes without clinical information such as associated indications, patient information (ie, age, sex, number of people living with HCV), or geographic location of dispensation.[17,18] Expenditure on DAAs was obtained from the IQVIA NSP and GPM databases, which contain prescription transactions from American and Canadian community pharmacies and outpatient dispensing. At the national level, the IQVIA database is composed of approximately 56 000 pharmacies in the United States and 6000 Canadian pharmacies, and captures more than 90% and 78% of all prescriptions dispensed in the United States and Canada, respectively.[16,19-21] The captured prescription data is projected to be representative of national levels in both countries. IQVIA data is regularly used for research purposes because it estimates prescription volumes from all payers (both public and private) and is not affected by specific regional reimbursement policies.[22]

Data from the US Bureau of Economic Analysis and Statistics Canada database were used to obtain quarterly population estimates for the years 2014 to 2018.[23,24] These estimates were used to population-standardize expenditure data.

We used descriptive statistics to report the total expenditure on HCV medications in the United States and Canada for each quarter of the study period. In addition, we calculated population-adjusted HCV medication costs per 100 000 people to compare national spending between the 2 countries. We also conducted a sensitivity analysis at 20%, 40%, and 60% reductions to account for discounts/rebates. All cost data were converted into USD 2017 using the global foreign exchange rates listed by the Organisation for Economic Co-operation and Development.[25]

Results

Overall, the total expenditure on HCV medications between January 1, 2014, and June 30, 2018, (4.5 years) totalled $59.7 billion and $2.8 billion for the United States and Canada, respectively (Table 2). In the first 4 quarters of this study (Q1-2014 to Q4-2014), the United States spent $11.4 billion, whereas Canada spent $183.3 million (1.6% of what the United States spent). In the last 4 quarters of the study (Q3-2017 to Q2-2018), the United States spent a total of $8.8 billion and Canada spent $820.1 million (9.3% of what the United States spent).

Over the entire study period, the population-adjusted HCV medication costs were higher in the United States ($1.0 million per 100 000 population) compared with Canada ($0.4 million per 100 000 population); however, the trends in costs over time differed between the 2 countries (Fig. 1). In the United States, the population-adjusted annual medication costs between the years 2014 to 2017 ranged from $0.8 million to $1.4 million per 100 000 population. Peak spending of $1.6 million per 100 000 population occurred in Q2-2015, with the lowest rate of spending ($0.6 million per 100 000 population) occurring in the last quarter of the study period (Q2-2018). In contrast, in Canada, medication costs between the years 2014 to 2017 ranged from $0.1 million to $0.5 million per 100 000 population. Peak spending of $0.7 million per 100 000 population occurred in Q4-2015, with lowest spending ($0.02 million per 100 000 population) occurring in the first quarter of the study period (Q1-2014).

Table 1. List of direct-acting antiviral agents (generic and brand names) with drug prices in the United States and Canada.

Brand name	Generic name	Strength	Drug Prices (28 days' supply prescription)		Percentage Difference (%) in US vs Canadian Drug Prices (USD)‡
			United States* (USD)	Canada† (converted to USD)	
Victrelis	Boceprevir	§			N/A
Daklinza	Daclatasvir	30 or 60 mg	$20 798	$9570	+74%
Harvoni	Ledipasvir/sofosbuvir	90/400 mg	$10 088	$17 806	−55%
Technivie	Ombitsavir/paritaprevir/ritonavir	12.5/75/50 mg	$12 656	Not approved	N/A
Viekira Pak	Ombitsavir/paritaprevir/ritonavir + dasabuvir	250/12.5/75/50 mg	$6876	Not approved	N/A
Olysio	Simeprevir	§			N/A
Sovaldi	Sofosbuvir	400 mg	$27 728	$14 618	+62%
Incivek	Telaprevir	§			N/A
Zepatier	Elbasvir/grazoprevir	50/100 mg	$7216	$14 889	−69%
Maviret or Mavyret	Glecaprevir/pibrentasvir	100/40 mg	$4367	$5319	−20%
Epclusa	Velpatasvir/sofosbuvir	400/100 mg	$6728	$15 946	−81%
Vosevi	Sofosbuvir/velpatasvir/voxilaprevir	400/100/100 mg	$24 679	$15 946	+43%
Ibavyr	Ribavirin	200 mg	$28	$168	−142%

N/A indicates not available; USD, US dollar.
*Based on GoodRx (https://www.goodrx.com) as of October 5, 2019.
†Based on the Ontario Drug Benefit Formulary (https://www.formulary.health.gov.on.ca/formulary/) as of October 5, 2019.
‡Calculation for percentage difference: [|US − CAD|/(US + CAD)/2)] × 100%.
§No longer available on GoodRx. Not approved by Health Canada.

Table 2. Yearly expenditures on HCV medications in Canada and the United States.

Year	Expenditures on HCV medications in the United States (USD)	Expenditures on HCV medications in Canada (USD)
2014	11 415 937 266	183 320 376
2015	18 398 935 365	780 899 922
2016	15 470 504 574	695 396 044
2017	10 495 286 283	747 840 961
First 2 quarters (Q1 and Q2) of 2018	3 944 122 282	418 849 331
Total Spending in Study Period	59 724 785 770	2 826 306 634

HCV indicates Hepatitis C virus; USD, US dollars.

In a sensitivity analysis that accounted for 20%, 40%, and 60% discounts/rebates, the total expenditure across the study period ranged between $23.9 to $47.8 billion and $1.1 to $2.3 billion in the United States and Canada, respectively.

Discussion

HCV medications are a major investment for both the United States and Canada. In the 4.5-year period studied, $59.7 billion and $2.8 billion were spent on HCV medications by the United States and Canada, respectively. This represents an estimated 2.3% and 1.9% of total drug spending by the United States ($455.9 billion) and Canada ($39.8 billion), respectively.[15,16] These findings highlight differences in both the reimbursement utilization policy for HCV treatments between these countries and major differences in drug pricing policies.

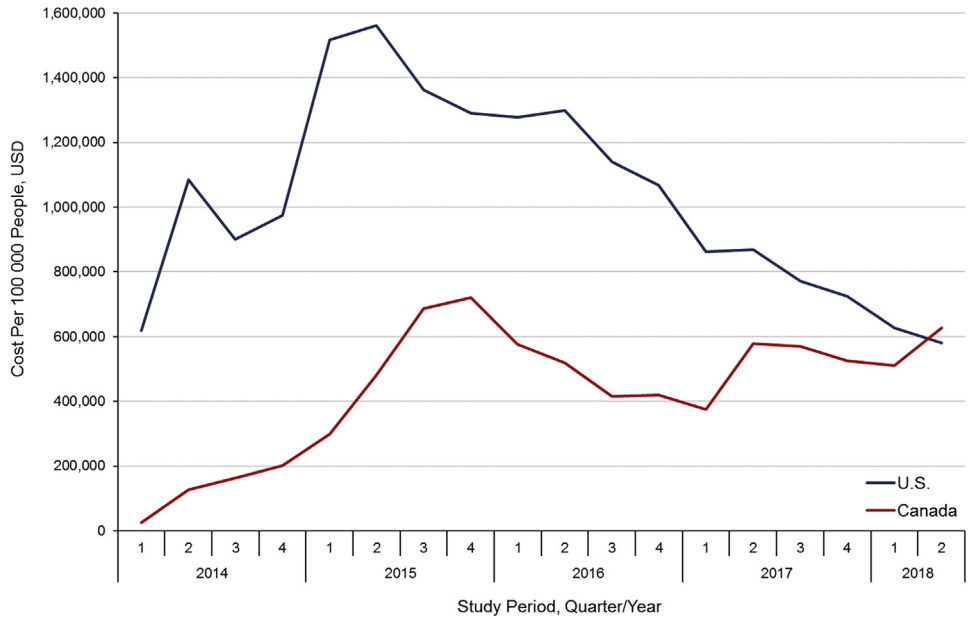
Although the rates of HCV infection are similar between the 2 countries,[26,27] the trends in uptake of HCV medications have differed over time. First, differences in when DAAs were first approved in each country (2011 in the United States and 2012 in Canada) led to staggered uptake.[28,29] This led to the United States reaching their spending peaks earlier (Q2-2017) compared with Canada (Q4-2017).

Second, the public-facing prices of DAAs are higher in the United States, in turn leading to higher population-standardized expenditure per 100 000 people compared with Canada (see Table 1, Fig. 1). For example, one pill of Sovaldi® costs approximately $1000 in the United States compared with $535 in Canada. This brings the total cost of the 12-week treatment to $84 000 (United States) and $45 000 (Canada). Lastly, as of 2017, Canada has liberalized the listing of these agents on a national level, whereas the United States has a mixed model of prior authorization and stepped access, which varies greatly by payer and region.[30,31] This led to Canada increasing their population-adjusted expenditure on these agents and eventually surpassing the United States in Q2-2018.

Importantly, these results have implications on a broader discussion of drug pricing. This expensive class of drugs highlights the differences between US and Canadian public-facing drug pricing. Policies that have been suggested, such as the international pricing index model for Medicare Part B drugs[32] (using Canadian pricing), could dramatically lower public-facing prices. Based on our findings, the potential savings of such a policy would be nearly $25.1 billion on HCV medications alone (Canada's population-adjusted spending was 42% less). Although pressure on the US healthcare system could be as low as $10 billion after accounting for a 60% rebate, this is still a significant cost that would have major implications for federal budgets.

This study has relevance for public health and policy makers because it provides a measure of the costs associated with HCV medication prescribing in the United States and Canada. This study raises important questions about the different policies needed to manage HCV-infected patients at the treatment level

Figure 1. Population-standardized (1 000 000 people) quarterly expenditure on hepatitis C medications from January 2014 to June 2018 in the United States (blue) and Canada (red).



and the population level. One approach is to treat all those who are currently infected with HCV, aiming for a reduction in overall infection rates in the population. This broader approach requires a greater initial investment but would potentially lead to reduced long-term healthcare spending on HCV (ie, less HCV transmission, less hospitalizations, etc).[33] An opposing approach is to allocate an annual budget to treat those who have more advanced HCV infections. To date, some evidence from economic models have suggested that the first option (treat all those currently infected with HCV) would be more cost-effective in the long-term.[34,35] Currently the US payers use a mix of both approaches, whereas Canada has recently started to take a broader approach. Even within the United States, there is evidence for variation in uptake that may influence the impact of these policies.[36] Given these differences, there is a need to evaluate the impact of these approaches to better understand the real-world implications on spending and patient outcomes.

Our results are not without limitations. First, expenditure data in this study makes use of reimbursed prices, and the details of price reductions through confidential pricing agreements in both Canada and the United States are unknown. Thus the reported expenditure figures in this analysis are not the actual prices that were paid by drug payers because we do not have access to privately negotiated prices that are not made public. Nevertheless, the prices listed in this analysis do affect the "starting point" for negotiations for large governmental payers. Importantly, these "sticker-prices" are often the prices that are paid out-of-pocket by patients and smaller payers and organizations. Secondly, IQVIA's NSP databases only include aggregate prescription volumes without clinical information such as associated indications, patient information (ie, age, sex, number of people living with HCV), or geographic location of dispensation, precluding further descriptive analysis.[21] Nevertheless, this has a limited impact on our analysis because medications with multiple indications represent $<1\%$ of total costs.

Conclusion

Overall, both the United States and Canada have spent substantial amounts on HCV medication, although the United States spends more per capita on these medications despite the rates of HCV infection being similar between the countries. As policies to reduce drug spending in the United States are explored, this article highlights the potential cost implications of implementing Canadian index pricing.[16] Given the high expenditure on this class of medications, there is an ongoing need for evaluation of varying reimbursement policies to ensure a return on investment and improved patient outcomes.

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