

Medicare Cost Drivers during the 2004–2014 Health Accord Period in Canada: What Is the Evidence?

Inducteurs de coûts pour l'assurance maladie pour la période 2004–2014 de l'Accord sur la santé au Canada : quels sont les faits?



RUOLZ ARISTE, PHD

PhD Candidate

Researcher, Université Laval and Université du Québec en Outaouais (UQO)

Gatineau, QC

Abstract

As per the *Canada Health Act*, hospital and physician services (Medicare) are covered by the public sector. With the 2004 First Minister's Health Accord showcasing a 10-Year Plan to strengthen healthcare in Canada, significant investments have been made to improve access to these services. The average annual growth rate (AAGR) of spending between 2004 and 2014 was 5.1% for hospitals and 6.6% for physicians. The key policy question is whether or not these increases were just used to boost unit cost? An accounting approach was used to address this issue. Results suggest that for hospitals, wage per hour for staff (excluding physicians) accounted for 49% of the AAGR for hospitals (2.5 percentage points [pp]), while fee increases accounted for 47% of the AAGR for physician spending (3.1 pp). However, considering that general inflation was on average 1.8% per year, the health premium for physicians represented almost twice that for hospital staff.

Résumé

Conformément à la *Loi canadienne sur la santé*, les services hospitaliers et médicaux sont couverts par le secteur public. Avec l'Accord 2004 des premiers ministres sur la santé, qui présente un plan de 10 ans pour le renforcement des services de santé au Canada, d'importants investissements ont été faits afin d'améliorer l'accès aux services. Le taux de croissance annuel moyen (TCAM) des dépenses entre 2004 et 2014 était de 5,1 % pour les hôpitaux et de 6,6 % pour les médecins. La grande question de politiques publiques est de savoir à quel point ces augmentations ont servi à gonfler le coût unitaire. Une démarche comptable a été utilisée pour traiter cette question. Les résultats suggèrent que pour les hôpitaux, le salaire horaire des employés (à l'exception des médecins) a compté pour 49 % du TCAM de l'hôpital (2,5 points de pourcentage [pp]), tandis que l'accroissement des coûts comptait pour 47 % du TCAM des dépenses pour les médecins (3,1 pp). Cependant, puisque l'inflation générale était en moyenne de 1,8 % par année, la prime santé des médecins représente presque le double de celle des employés des hôpitaux.

Introduction

During the last 20 years, healthcare spending has gained increasing attention from policy makers in Canada and other industrialized countries because of its rising trends, both in dollar values and as a percentage of national income. Given government fiscal constraints, public spending on health is of particular interest. As per the *Canada Health Act*, a federal act that specifies the conditions and criteria with which the provincial and territorial health insurance programs must conform to receive federal health transfer payments, hospital and physician services in Canada (Medicare) are universally covered by the public sector. With the 2004 First Minister's Health Accord showcasing a 10-Year Plan to strengthen healthcare in Canada, significant investments have been made to increase operational capacity, improve access and reduce wait time for these services (CBC 2016). This situation makes the 2004–2014 period an interesting one on which to focus. The combined average annual growth rate (AAGR) of Medicare services between 2004 and 2014 was 5.6%. For the same period, the Gross Domestic Product (GDP) grew at an average annual rate of 4.1%.

Based on the fact that Medicare spending has grown faster than GDP, some studies suggest that publicly funded healthcare would not leave room for growth for other important government programs and therefore is unsustainable (Drummond and Derek 2010; Skinner and Rovere 2008).¹ On the other hand, others argue that GDP growth can shoulder the spending pressures from healthcare (Lee 2007; Ruggeri 2006) and it is basically a question of public choice (Evans 2007; Romanow 2002). So, there are different perspectives on the issue of sustainability (Di Matteo 2010). Nonetheless, Medicare spending growth can be broken down into different factors in order to assess the weight of each one relative

to total growth. A few studies have addressed the physician cost drivers issue in Canada (CIHI 2011; Contandriopoulos and Perroux 2013; Grant and Hurley 2013). However, cost drivers for Medicare services combined have not been studied, particularly in the context of the 2004–2014 Health Accord.

The objective of the study is to determine whether increases in spending were used mainly to boost unit prices or to buy more services over the 2004–2014 period. In fact, an increase in expenditure may arise from a price change, which can be caused by a higher compensation rate for staff. On the other hand, it can be caused by increased utilization of healthcare services due to demographic, morbid, technological or fiscal changes. The distinction between these two components of expenditure changes can be the key information in the process of finding policy solutions to the health sustainability issue because increased utilization of quality health services may improve access to health services and health outcomes. Cost drivers are those underlying factors that have an impact on healthcare costs. They include the effects of general and sector-specific inflation, population growth, aging and other utilization-related factors such as income or fiscal capacity, morbidity, new technologies, etc. Health decision-makers have only minimal control on some of these factors, such as general inflation and aging, while they can exercise a greater control on others, such as sector-specific inflation or new technologies.

Some drivers are more pronounced during the expansion phase of the business cycle (fluctuation of economic activity) than during the contraction phase. The 2004–2014 period can be seen as a complete business cycle, as it includes both an expansion and a contraction period. After the 2008 recession, due to fiscal constraints, governments tended to rein in healthcare costs, which could result in weak growth in hospital and physician spending or services. Breaking down spending growth on Medicare services over the 10-year Health Accord period can inform policy makers about what the additional money has bought, independent of the business cycle. The rest of the report is organized as follows: section 2 presents an overview of the data and methodology for the assessment of the impact of different factors on healthcare costs; in section 3, we review the level and growth rate of Medicare spending; the impact of the different factors – sector-specific inflation, population growth, aging and others – is assessed and discussed in section 4; section 5 addresses the limitations of the study and is followed by the conclusion.

Methods

The main data sources were the National Physician Database (NPDB), the Canadian Management Information System (MIS) Database (CMDDB) and the National Health Expenditures Database (NHEX) from the Canadian Institute for Health Information (CIHI). The Survey of Employment, Payroll and Hours (SEPH), Economic Accounts and Demography Division data from Statistics Canada were also used. The framework for the analysis consists of breaking down Medicare spending growth into its different measurable components, by using the natural logarithm of the following equation:

$$\text{Total spending}_i = \text{Unit cost}_i \times \frac{\text{Volume of service}_i}{\text{Population}} \times \text{Population (i)}$$

Where *i* refers to either the hospital or the physician sector.

Change in unit cost permits to determine sector-specific inflation (including general inflation). Population change in this equation refers not only to change in the size of the population (population growth), but also to change in its structure (aging). Note that the volume of services, which is a key factor in assessing cost drivers, is not explicitly measured in this paper. It is proxied by the residual called “utilization/other” which is adjusted for demographic factors (population growth and aging) and includes factors such as technology, fiscal capacity, morbidity, etc.

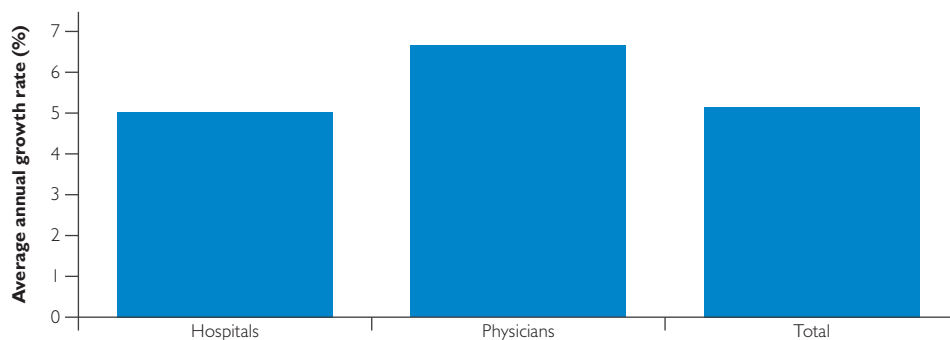
Sector-specific inflation is measured using SEPH (for hospital staff) and NPDB compensation index (for physicians). General inflation is measured by the consumer price index (CPI); all-items. The use of a price index to deflate expenditures is generally controversial. The all item-CPI was chosen because it takes into account all the consumer goods and services; therefore, it is a better representation of the general public. Moreover, it is a well-known index generally used to assess changes in the cost of living and adjust government programs such as pensions.

For the aging effect, the 2004 population, broken down by province, gender, and 5-year age groups, was multiplied by the 2014 expenditure per capita for each of the corresponding age group and sex. The results were summed for each sex. The totals for each sex were added to have the 2014 estimates of expenditure at the 2004 population structure (simulated expenditures).

After these factors have been estimated, the other factors such as technological change, fiscal capacity, level of morbidity, etc., are considered as a residual. The latter is referred in some studies as the enrichment factor (Askari et al. 2010; Constant et al. 2011). It should be noted that the framework used in the current study is relatively similar to the one used in several studies on healthcare cost drivers (Barer and Evans 1983; CIHI 2011; Newhouse 1992).² This paper innovates in the sense that it pulls hospital-based payments to physicians out of hospital spending and re-allocates it to physician spending, offering a complementary, more comprehensive way to consider physician spending. Moreover, the accounting decomposition approach and the CPI-adjustment applied to Medicare spending in this pivotal moment in the Canadian healthcare system represents a contribution in the analysis of health spending.

What Was the Level, Growth Rate and Share of Medicare Spending?

Public sector hospital spending amounted to \$35.3 billion in 2004 and \$57.7 billion in 2014. This represents an AAGR of 5.1%. As for physicians, spending was \$17.0 and \$32.3 billion, respectively, in 2004 and 2014, corresponding to an AAGR of 6.6%. Combining the two results in an amount of \$52.3 and \$90.0 million for Medicare spending, respectively, in 2004 and 2014; an AAGR of 5.6%. Figure 1 shows that AAG of physician spending was higher than that of hospitals or total spending.

FIGURE 1. Average annual growth rate of hospital, physicians and total public sector spending, 2004–2014

Sources: The National Physician Database and the National Health Expenditure Database from the Canadian Institute for Health Information.

Public sector total spending was estimated at \$152 billion in 2014; of which Medicare spending represents a share of 59.3% (37.9% for hospitals and 21.3% for physicians). The physician spending in this figure excludes physicians working in hospitals. That's because the NPDB scope captures only physicians paid under the medical care plan (MCP). Compensation for physicians on hospital budget is not captured in NPDB. Even if we have chosen NHEX as a source for physician spending, those physicians on hospital budget would have still been excluded. In fact, in the NHEX framework, physicians on hospital budget are captured in the hospital category, and not in the physician category.

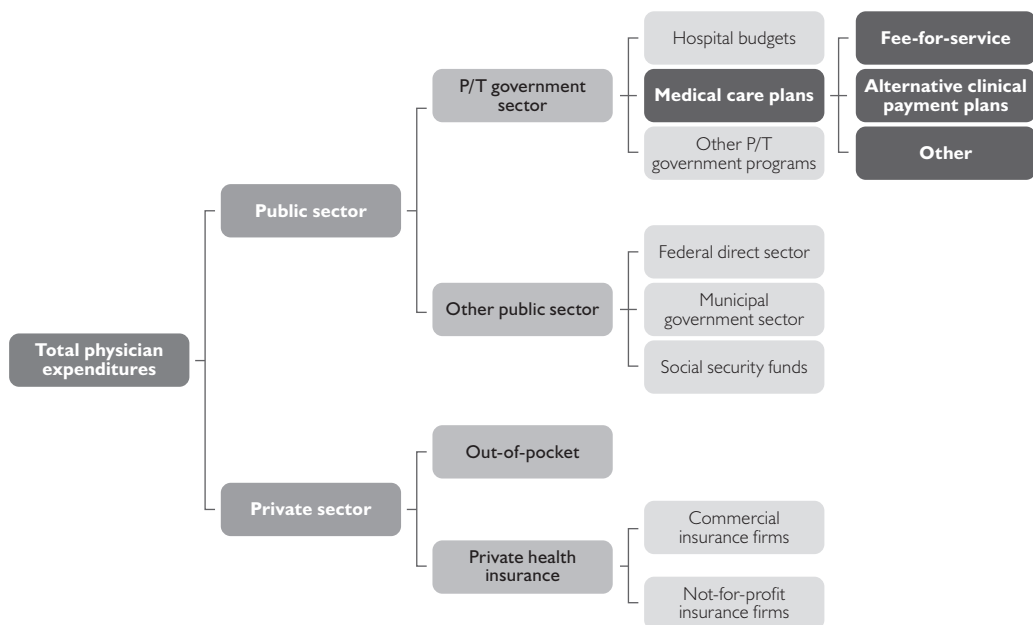
In order to know how much Canada spends on physician services, it is not enough to take the NPDB or NHEX figure for physicians, because neither is comprehensive of all physician expenditures in the country. The physician payment reported in NPDB includes only the amount reimbursed by the MCP. On the other hand, the physician category reported in NHEX is not comprehensive of all physician expenditures in the country. Canada's National Health Accounts are based on an international system of health accounting that includes the hospital category expenditures for the services of physicians that are employed and paid by hospitals. Figure 2 presents a modified framework that pulls hospital-based payments to physicians out of hospital spending and re-allocates it to physician spending. It shows expenditures by all major sources of finance in Canada.

Table 1 is based on this structure and shows a more comprehensive distribution of physician expenditure that includes estimates of payments to physicians paid through the major sources of finance from 2004–2005 to 2014–2015. With the inclusion of physician expenditure paid through hospital budgets, overall expenditure on physician services in Canada is estimated to have been \$38.1 billion in fiscal year 2014–2015, or 17.7% of total health spending (\$37.7 billion from public sector or 24.8% of total public sector health spending).

Based on this framework, estimate of expenditure paid through hospital budgets amounted to \$4.9 billion (or 13.0% of public spending on medical care) in fiscal year 2014. Much of this expenditure is for the salaries of doctors such as pathologists, radiologists, medical biochemists and medical microbiologists, who are employed and paid by hospitals rather than by the provincial or territorial medical care plan. The \$37.7 billion on physician

public-sector spending in 2014 includes physicians on hospital budgets, MCP as well as “Other Public Sector” spending on physicians, such as direct medical services financed by the federal government for targeted populations (e.g., the Indigenous population), and medical aid expenditures financed by social security funds such as Workers Compensation Boards. This represents a share of 24.8% of public sector total spending; a 3.5-percentage point (pp) increase compared to the NPDB limited scope or the NHEX framework (of course, Medicare spending remains at the same level of \$90.0 billion, which means that hospital spending was proportionally reduced).

FIGURE 2. Sources of finance of physician services



P/T = provincial/territorial.

The nuance described above permits to distinguish between the AAGR of spending on physicians working in hospitals (on hospital budgets) versus those who are non-hospital based on MCP, either fee-for-service (FFS) or alternative payment plans (APPs). Figure 3 presents the AAG of compensation for hospital personnel: unit-producing personnel (UPP), management and operational support (MOS) and medical personnel (MP) as well as FFS physicians.

Spending on hospital-based physicians grew at an AAGR of 7.1% during the 10-year period under study while it was 6.6% for physicians paid under the MCP, 5.7% for physicians on FFS and 10.4% for physicians on APP (remember that this AAGR in spending could be due to unit price increase, volume of services or a combination of both). Even though the AAGR was the lowest for physicians on FFS, it was still higher than that of other professionals working in hospitals. However, higher pace of growth in payment for physicians on APP in the MCP or on hospital budgets suggests that the FFS scheme in the MCP has become less attractive.

TABLE 1. Physician expenditure, by source of finance, Canada, from 2004–2005 to 2014–2015

Year	Public sector							Private sector (NHEX table C.2.1)	Total (including physicians working in hospitals)
	P/T government sector					Other public sector (NHEX table C.5.1)	Total public sector		
	Paid through hospital budgets (CMDB-MP Comp)	Paid through MCPs		Other P/T government programs (residual)	Subtotal				
		Fee-for-service payments	Alternative clinical payments						
Expenditure (\$'000,000,000)									
2004–2005	2.4424	10.3959	2.6444	3.9354	19.4181	0.3362	19.7543	0.2324	19.9867
2005–2006	2.7389	11.1141	2.9611	4.1566	20.9707	0.3849	21.3556	0.2539	21.6095
2006–2007	3.0912	11.5753	3.3761	4.7294	22.7720	0.4246	23.1966	0.3040	23.5006
2007–2008	3.4306	12.1583	4.1292	4.9823	24.7004	0.4362	25.1366	0.2442	25.3808
2008–2009	3.8791	12.9207	5.0061	5.5086	27.3144	0.4956	27.8100	0.3903	28.2004
2009–2010	4.1661	13.9944	5.2832	5.9553	29.3990	0.4923	29.8913	0.3981	30.2895
2010–2011	4.3030	14.7025	5.8004	6.6005	31.4065	0.5174	31.9239	0.2959	32.2198
2011–2012	4.5778	15.7414	6.3568	6.6565	33.3326	0.5206	33.8532	0.3642	34.2174
2012–2013	4.6681	16.1430	6.7152	6.6500	34.1763	0.5377	34.7139	0.4432	35.1572
2013–2014	4.8127	17.1534	6.9370	7.0484	35.9514	0.5219	36.4733	0.3898	36.8631
2014–2015	4.8787	17.8832	7.0973	7.3332	37.1925	0.5159	37.7084	0.4092	38.1176

MCPs = medical care plans; MP = medical personnel; P/T = provincial/territorial.

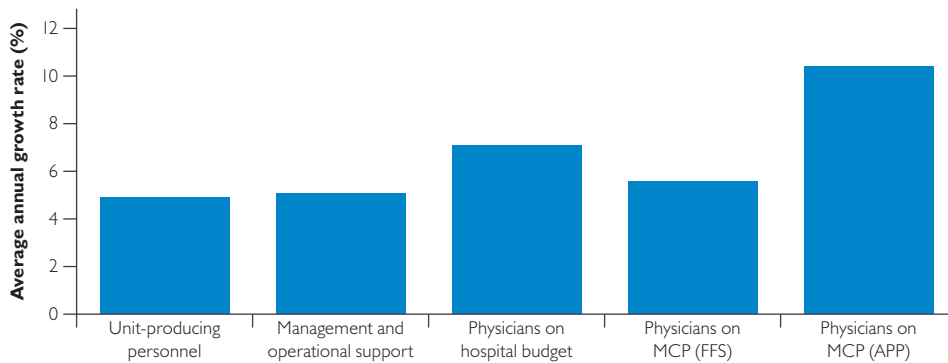
Sources: The Canadian Management Information System Database (CMDB), the National Physician Database and the National Health Expenditure Database (NHEX) from the Canadian Institute for Health Information.

What is the Contribution of Different Factors to Increases in Medicare Spending?

As previously mentioned, AAGR in hospital and physician spending has been estimated, respectively, at 5.1% and 6.6% for the years 2004 and 2014. Figure 4 shows the contribution of each factor to this overall increase.

In the case of hospitals, wage per hour for staff (excluding physicians) accounted for 2.5 pp of the total AAGR while demographic factors were responsible for 2.2 pp (1.1 pp for population growth and 1.1 pp for aging). The residual (0.4 pp) is attributed to other factors such as increased use due to technology, mix of services, level of morbidity, etc. As for physicians, average unit fee was responsible for 3.1 pp of the total AAGR; demographic factors accounted for 1.8 pp (1.1 pp for population growth and 0.7 pp for aging). This leaves 1.7 pp for other factors (among others, higher number of physicians) and suggests that unit cost was a relatively important cost driver in hospital and physician spending growth.

FIGURE 3. Average annual growth of compensation for hospital personnel (unit-producing personnel, management and operational support, and medical personnel) and physicians on MCP



APP = alternative payment plan; FFS = fee-for-service; MCP = medical care plan.

Sources: The Canadian Management Information System Database and the National Physician Database from the Canadian Institute for Health Information.

FIGURE 4. Breaking down Medicare spending growth, 2004–2014



Sources: The Canadian Management Information System Database, the National Physician Database and the National Health Expenditure Database from the Canadian Institute for Health Information, and the Survey of Employment, Payroll and Hours (Demography Division) from Statistics Canada.

Sector-specific inflation, including general inflation

It should be noted that AAG in unit cost represents sector-specific inflation. As such, it includes two components: general inflation and a “health premium” defined as inflation above and beyond general inflation.

$$\text{Health premium} = \text{Sector-specific inflation} - \text{General inflation (2)}$$

Considering that general inflation (as measured by the CPI—all items) was on average 1.8% per year, growth in inflation-adjusted unit cost for physicians was 1.3% per year. This can be considered as a “health premium” for physicians which represented almost twice that for hospital staff.

Population growth and aging

Population growth and aging are two demographic factors responsible for increasing health-care costs. Population growth, which was on average 1.1% per year over the 2004–2014 period, has been traditionally accounted for in healthcare funding. On the other hand, aging arises from changes in the population distribution that results in a larger fraction of the population being in the older, high-health-cost age groups, for a given profile of health expenditures across age. The aging effect, which is not usually considered in healthcare funding, accounted, respectively, for 21.6% and 10.6% of the growth in hospital and physician spending.

Other factors

As previously stated, the “Other” category is a residual, which may include utilization-related factors such as: technology, fiscal capacity, efficiency level, etc. This section provides an overview of possible impact of these utilization-related factors in driving costs.

Technological change is commonly believed to be one of the factors responsible for increases in health spending because of price rigidity and latent demand that leads to increased utilization. The size of its effect is difficult to quantify² and its role in driving healthcare costs is not a clear-cut picture (Sorenson et al. 2013). The RAND Corporation suggests that two related policy goals should be pursued when addressing medical technology as a cost driver: (1) reduce total healthcare spending with the smallest possible loss of health benefits, and (2) ensure that new medical products that increase spending are accompanied by health benefits that are worth the spending increases (Garber et al. 2014).

Between 2004 and 2014, real GDP per capita has increased at an AAGR of 0.8% in Canada (CANSIM Tables from Statistics Canada: 384-0037 for nominal GDP at market prices, 380-0102 for GDP index and 051-0001 for population). In terms of Medicare, this *fiscal capacity* was translated to increase the number of earned hours for hospital staff (1.0% when adjusted for population) as well as the number of physicians (1.7% when adjusted for population). More physicians would translate into more services. AAGR in total number of services adjusted for population growth and aging was estimated at +0.5%.³ From the payer perspective, efficiency in providing Medicare services should also be considered. A crude measure of productivity that is commonly used is the number of output per hour (or in the health sector: number of services per full-time equivalent [FTE] worker). In the case of physicians, crude productivity may have decreased because of the significant increase in the number of physicians (Ariste 2015).⁴ However, quality-adjusted output generally results in an increase in productivity compared to crude productivity (which is not adjusted for quality). This could give a different picture of physician productivity. Baumol (2012) suggests that crude productivity is more pertinent when we want to know how much money consumers must pay for a product (if we want to know how desirable the product is, then quality-adjusted productivity is more appropriate). In the case of hospitals, no measure of crude productivity is available for the period under study. However, Gu and Morin (2012) estimate that labour productivity, based on a quality-adjusted output, has increased 2.6% annually over the 2002–2010 period.

Discussion and Policy Implications

Cost drivers are generally complex and it's even more the case for the category "Other." Factors should be interpreted as estimated contribution. Although discussed separately, they can interact with each other to form sophisticated dynamics. For example, technology and efficiency tend to interact and reinforce each other. Likewise, technology and fiscal capacity can interact, resulting in an overall interaction among the three. Nonetheless, these results are generally in line with other similar studies which found that unit price is the main driver of physician spending (CIHI 2011; Grant and Hurley 2013).⁵ The "Other" (enrichment) factor was also an important one in the literature (Constant et al. 2011).

Increased federal spending through the Canada Health Transfer tends to increase provincial Medicare spending because of the sheer expectation of wage/fee increase by unions and medical associations. It is not surprising to see almost half the increase in Medicare spending being driven by wage/fee increase. Federal government could negotiate a percentage increase in hourly wage/unit fee during the existence of a particular health accord that should not exceed that expected in the general economy or in the public sector, as suggested by Leonard and Sweetman (2015).

Our finding suggests that the FFS scheme in the MCP has become less attractive. This could be exacerbated by the fact that physicians on this scheme generally incur higher overhead costs than their counterparts on APP or hospital budgets. Even though this study does not make the distinction between family medicine physicians and specialists, the differing rates in payments likely matter more for family medicine physicians than specialists (the reason is that throughout time, the latter inherently benefit more from technological progress and consequently can produce more services per unit of time [Ariste 2015]). This could lead to a shortage of family medicine physicians willing to start practising in the FFS scheme, as recently suggested in a *CBC News* article for Nova Scotia (Ray 2017).

Limitations of the study

Sector-specific inflation for hospitals is measured from payroll data. While compensation made up to 74% of hospital costs, there are other items involved in running a hospital, such as drugs, medical equipment and supplies, etc. These items were not disaggregated into unit price and volume. However, given their relatively weaker weight, they would not substantially change the main results.

Physician compensation represents gross payments. Physicians incur overhead costs that should be accounted for. To the extent that these costs remained proportionally the same throughout time, this should not significantly alter the results. Using the Physician Office category in the SEPH, hourly wage for employees in physician offices has increased at an AAGR of 2.6%; virtually the same as for hospital employees and less than the unit price of physician services. While overhead costs include other components, their growth is not likely to surpass the 3.1% AAG in unit fee for physician services, which suggests that the "health premium" is not likely reduced by considering overhead costs.

Conclusion

This paper has reviewed the role of different factors in explaining Medicare spending growth. Unit price was a relatively important factor that accounts for the overall spending increase. In the case of both hospitals and physicians, it was responsible for almost 50% of the total cost increase. Yet, this unit price increased more substantially for physicians than for hospital staff, which translates to a physician “health premium” of 1.3 pp (almost twice that of hospital staff). Aging did not represent a major cost driver for the Medicare system (about 11% of total cost increase for physicians, but up to 22% for hospitals). Other factors such as technological change or fiscal capacity (e.g., higher number of health workers per capita) accounted for about 26% of the overall growth for physician spending, but only 8% for hospital spending. Key issues to watch for in the future include ensuring that unit price increases for Medicare services stay in-line with that in the rest of the economy or better, get adjusted for technological improvement (e.g., if a given procedure originally took one hour to perform and thanks to technological improvement now takes 15 minutes, the time is reduced by 75%. The unit fee could be reduced by 10%, not by the full 75%, to allow for equipment amortization, learning curve cost and providers’ incentives); breaking silos between hospital and physician spending for resource allocation that targets relatively similar unit price for physicians on FFS, APP or hospital budgets in a given specialty; and population aging having a potentially higher impact on Medicare expenditures at the peak of the baby boom effect.

Correspondence may be directed to: Ruolz Ariste, Université Laval and Université du Québec en Outaouais (UQO), 283 Boulevard Alexandre Taché, PO Box 1250, Hull division, local C3700 Gatineau, QC J8X 3X7; tel.: 819-595-3900 ext. 1894; e-mail: arir03@uqo.ca.

Acknowledgement

The author wishes to acknowledge Geoff Ballinger from CIHI for his contribution to the modified framework to comprehensively capture physician expenditures. However, the views expressed in the paper are those of the author and do not represent those of any institution or other person.

Notes

1. A well-accepted definition of sustainability used by various authors is the “sufficiency of resources over the long term to provide timely access to quality services that address Canadians’ evolving health needs” (Marchildon et al. 2004).
2. Health economists have tried to decompose individual cost drivers using two main approaches: regression-based or accounting-based. In the regression-based approach, the typical method is to estimate a linear regression model of healthcare expenditures on a set of known cost drivers, such as demographics, income, price inflation and variables, intended to capture the residual component directly, such as R&D spending (AGPC 2005; Okunade and Murthy 2002), or indirectly, such as year dummies (Di Matteo 2005; Grootendorst and Nguyen 2011) or a linear time trend (Di Matteo 2010). This residual is generally believed to

include mostly technological change. The accounting approach approximates the annual rate of change in spending as the sum of the annual rates of change in the respective cost drivers. The unexplained portion is considered a residual. This approach is a good approximation of the discrete changes in cost drivers actually seen in the data, has been prominently used and is more easily understood by policy makers. It has been chosen for these reasons.

3. Volume of services per capita by physicians on FFS has slightly declined (on average –0.05% per year) (CIHI 2017). However, when accounting for physicians on APP (by assuming same unit fee as physicians on FFS), the volume of services has increased, even when adjusted for population growth and aging.
4. For example, the number of FFS FTE physicians increased at an AAGR of 0.7% when adjusted for population. This suggests that the number of physicians on APP has also increased during the 2004–2014 period (CIHI 2017).
5. For example, the CIHI study found that unit price was responsible for 53% of the AAGR of physician spending between 1998 and 2008. Grant and Hurley (2013) looked at the historical trends to find out that the gap between an average doctor and the average worker's pay increased from three-and-a-half times to nearly four-and-a-half times between 2000 and 2010. They noted that all of this has occurred while physicians have actually provided slightly fewer services to patients. The level of decomposition for hospital spending is not so much detailed in the literature.

References

- Australian Government Productivity Commission (AGPC). 2005. *Impacts of Advances in Medical Technology in Australia*. Melbourne, AU: Author.
- Ariste, R. 2015. "Fee-Schedule Increases in Canada: Implication for Service Volumes among Family and Specialist Physicians." *Journal of Health and Human Service Administration* 38(3): 381–407.
- Askari, M., R. Barnett, J. Danforth, C. Matier, B. Recker and S. Tapp. 2010. *Fiscal Sustainability Report*. Ottawa, ON: Parliamentary Budget Officer.
- Barer, M.L. and R.G. Evans. 1983. "Prices, Proxies and Productivity: An Historical Analysis of Hospital and Medical Care in Canada." In Diewert, W.E. and C. Montmarquette, eds., *Price Level Measurement: Proceedings from a Conference Sponsored by Statistics Canada*. Ottawa, ON: Statistics Canada.
- Baumol, W.J. 2012. *The Cost Disease: Why Computers Get Cheaper and Health Care Doesn't*. New Haven, CT: Yale University Press.
- Canadian Institute for Health Information (CIHI). 2011. *Healthcare Cost Drivers – the Facts*. Ottawa, ON: Author.
- Canadian Institute for Health Information (CIHI). 2017. "National Physician Database Data Release, 2015–2016." Ottawa, ON: Author.
- CBC News. 2016 (December 19). *What is the Health Accord and What's at Stake in Monday's Talks?* Retrieved December 10, 2017. <<http://www.cbc.ca/news/politics/federal-health-accord-1.3903027>>.
- Constant, A., S. Petersen, C. Mallory and J. Major. 2011. *Research Synthesis on Cost Drivers in the Health Sector and Proposed Policy Options*. Ottawa, ON: Canadian Health Services Research Foundation.
- Contandriopoulos, D. and M. Perroux. 2013. "Fee Increases and Target Income Hypothesis: Data from Quebec on Physicians' Compensation and Service Volumes." *Healthcare Policy* 9(2): 30–35.
- Di Matteo, L. 2005. "The Macro Determinants of Health Expenditure in the United States and Canada: Assessing the Impact of Income, Age Distribution and Time." *Health Policy* 71(1): 23–42.

- Di Matteo, L. 2010. "The Sustainability of Public Health Expenditures: Evidence from the Canadian Federation." *European Journal of Health Economics* 11(6): 569–84. doi:10.1007/s10198-009-0214-x.
- Drummond, D. and B. Derek. 2010. *Charting a Path to Sustainable Health Care in Ontario: 10 Proposals to Restrain Cost Growth without Compromising Quality of Care*. Toronto, ON: TD Economics.
- Evans, R.G. 2007. *Economic Myths and Political Realities: The Inequality Agenda and the Sustainability of Medicare*. Vancouver: UBC for Centre Health Services and Policy Research.
- Garber, S., S.M. Gates, E.B. Keeler, M.E. Vaiana, A.W. Mulcahy, C. Lau et al. 2014. *Redirecting Innovation in U.S. Health Care: Options to Decrease Spending and Increase Value*. Santa Monica, CA: RAND Corporation.
- Grant, H. and J. Hurley. 2013. *Unhealthy Pressure: How Physician Pay Demands Put the Squeeze on Provincial Healthcare Budgets* (Volume 6, Issue 22). Calgary, AB: The School of Public Policy Research Papers, University of Calgary.
- Grootendorst, P. and V.H. Nguyen. 2011. *Health Technologies as a Cost-Driver in Canada. Final Report to the Strategic Policy Branch, Office of Pharmaceuticals Management Strategies, Health Canada*. Retrieved December 6, 2017. <<http://individual.utoronto.ca/grootendorst/pdf/grootendorst-et-al-final-report.pdf>>.
- Gu, W. and S. Morin. 2012. *Experimental Measures of Output and Productivity in the Canadian Hospital Sector, 2002 to 2010*. Ottawa, ON: Statistics Canada. Retrieved November 23, 2017. <<http://www.statcan.gc.ca/pub/15-206-x/15-206-x2014034-eng.pdf>>.
- Lee, M. 2007. *How Sustainable is Medicare? A Closer Look at Aging, Technology and Other Cost Drivers in Canada's Health Care System*. Vancouver, BC: Canadian Centre for Policy Alternatives.
- Leonard, P. and A. Sweetman. 2015. "Paying the Health Workforce." In G.P. Marchildon and L. Di Matteo, eds. *Bending the Cost Curve in Health Care: Canada's Provinces in International Perspective*. Toronto, ON: University of Toronto Press.
- Marchildon, G.P., T. McIntosh and P.-G. Forest (eds). 2004. *The Fiscal Sustainability of Health Care in Canada. The Romanow Papers Vol. 1*. Toronto, ON: University of Toronto Press.
- Newhouse, J. 1992. "Medical Care Costs: How Much Welfare Loss?" *Journal of Economic Perspectives* 6(3): 3–21.
- Okunade, A.A. and V.N.R. Murthy. 2002. "Technology as a 'Major Driver' of Health Care Costs: A Cointegration Analysis of the Newhouse Conjecture." *Journal of Health Economics* 21(1): 147–59.
- Ray, C. 2017. "Why Young Doctors Aren't Taking over from Retiring Physicians." *CBC News*, November 7, 2017. Retrieved December 6, 2017. <<http://www.cbc.ca/news/canada/nova-scotia/why-young-doctors-aren-t-taking-over-from-retiring-physicians-1.4389906>>.
- Romanow, R.J. 2002. *Building on Values: The Future of Health Care in Canada*. Ottawa, ON: Commission on the Future of Health Care in Canada.
- Ruggeri, J. 2006. "Health Care Spending, Fiscal Sustainability, and Public Investment." *Public Policy Paper*. Regina, SK: Saskatchewan Institute of Public Policy.
- Skinner, B.J. and M. Rovere. 2008. *Paying More, Getting Less. Measuring the Sustainability of Government Health Spending in Canada 2008 Report*. Vancouver, BC: Fraser Institute. Retrieved November 17, 2017. <<https://www.fraserinstitute.org/sites/default/files/PayingMoreGettingLess2008.pdf>>.
- Sorenson, C., M. Drummond and B.B. Khan. 2013. "Medical Technology as a Key Driver of Rising Health Expenditure: Disentangling the Relationship." *ClinicoEconomics and Outcomes Research* 5: 223–34. doi:10.2147/CEOR.S39634.