RESEARCH PAPER

Is Canadian Healthcare Affordable? A Comparative Analysis of the Canadian Healthcare System from 2004 to 2014

Les soins de santé sont-ils abordables au Canada? Analyse comparative du système de santé canadien de 2004 à 2014

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Abstract

Objective: To compare cost-related non-adherence (CRNA), serious problems paying medical bills and average annual out-of-pocket cost over time in five countries.
Methods: Repeated cross-sectional analysis of the Commonwealth Fund International Health Policy survey from 2004 to 2014. Responses were compared between Canada, the UK, Australia, New Zealand and the US.
Results: Compared to the UK, respondents in Canada, Australia and New Zealand were two to three times and respondents in the US were eight times more likely to experience CRNA; these odds remained stable over time. From 2004 to 2014, Canadian respondents paid US $852–1,767 out-of-pocket for care. The US reported the largest risks of serious problems paying for care (13–18.5%), highest out-of-pocket costs (US $2,060–3,319) and greatest rise in expenditures.
Interpretation: Over the 10-year period, financial barriers to care were identified in Canada and internationally. Such persistent challenges are of great concern to countries striving for equitable access to healthcare.

Résumé

Objectif : Comparer, dans cinq pays et au cours du temps, le non-respect lié aux coûts (NRLC), les problèmes graves concernant le paiement des factures pour services médicaux et la moyenne annuelle des dépenses non remboursées.
Méthodes : Analyse transversale répétée des enquêtes internationales du Fonds du Commonwealth sur les politiques de santé, de 2004 à 2014. Nous avons comparé les réponses du Canada, du Royaume-Uni (R.-U.), de l'Australie, de la Nouvelle-Zélande et des États-Unis (É.-U.).
Résultats : Comparativement au R.-U., les répondants du Canada, de l'Australie et de la Nouvelle-Zélande sont 2 à 3 fois plus enclins, et ceux des É.-U. 8 fois plus enclins, à vivre une expérience de NRLC; ces probabilités demeurent stables en fonction du temps. De 2004 à 2014, les répondants canadiens ont indiqué des dépenses non remboursées de 852 à 1 767 $US. Ceux des É.-U. ont indiqué les plus grands risques de problèmes graves concernant le paiement pour les soins (de 13 à 18,5 %), les dépenses non remboursées les plus élevées (entre 2 060 et 3 319 $US) et la plus grande croissance des dépenses.
Interprétation : Pour la période de dix ans, nous avons repéré les obstacles financiers pour les soins au Canada et à l'international. De tels défis constants constituent une préoccupation pour les pays qui s'efforcent d'assurer un accès équitable aux services de santé.

* * *

Introduction

Canadians are intensely proud of Medicare (Mendelsohn 2002) – the national, publicly funded health insurance program that provides first-dollar coverage for medically necessary physician and hospital services (Allin and Watson 2011). The program comprises 13 provincial and territorial healthcare systems and insurance plans, which share common elements and basic standards of coverage (Naylor et al. 2015). That said, there are still a variety of medical treatments and services not publicly covered and whose costs are often borne directly by Canadians as they access them.

Typically, such non-insured health services are provided or accessed outside of the hospital setting, potentially by non-physician healthcare providers. Such items can include routine dental care, chiropractic services, massage and physical therapy, routine vision care and – perhaps the largest noted gap – out-patient pharmaceuticals (Gagnon 2014). Currently, the costs of out-patient prescription drugs are covered through a patchwork of public provincial/territorial and private insurance plans, which must often be supplemented by out-of-pocket payments by patients at the point of use (Daw and Morgan 2012).

Approximately one in ten Canadians experience cost-related non-adherence (CRNA) to prescription drugs (i.e., inability to fill a prescription because of cost), particularly among those in poorer health and with chronic conditions, with lower income and without drug insurance (Campbell et al. 2014; Law et al. 2012). Further, with the increasing cost of prescription drugs and the significant shift of care out of the hospital, the financial burden to patients may be rising over time (Morgan et al. 2015).

Internationally, Canadians are not alone when it comes to experiencing financial barriers to care. Recent comparative analysis of 11 Organisation for Economic Co-operation and Development (OECD) nations found that nearly 7% of older adults in Australia and 17% in the US also experience CRNA relative to those in the UK (Morgan and Lee 2017). Yet despite these and similar findings (Hargreaves et al. 2015; Kennedy and Morgan 2006, 2009; Schoen and Doty 2004), little is known about the extent to which these relative financial barriers have evolved over time internationally.

For over a decade, the Commonwealth Fund has conducted the International Health Policy (IHP) survey to measure and monitor healthcare system performance internationally (Davis et al. 2014). The IHP survey ranks healthcare system performance based on the dimensions of quality, access, efficiency, equity and healthy lives (Davis et al. 2014). There are a series of questions pertaining to healthcare coverage, experience with administrative/financial burdens and out-of-pocket medical costs. The repeated collection of cross-sectional survey data offers rich insight into the perceived affordability of healthcare systems internationally and the evolution of these perceptions over time. To our knowledge, however, there have been no cross-national studies examining potential cost-related barriers to healthcare over time using multiple years of the IHP survey data.

The objective of the present study is to compare the odds of CRNA, private health insurance coverage, serious problems paying for medical bills, as well as the extent of average annual out-of-pocket cost reported by Canadians over time and relative to those in the UK, Australia, New Zealand and the US. This selection of countries has participated in the IHP survey since its inaugural survey year and represents "peer" countries often used to benchmark the Canadian healthcare system.

Methods

Data source

The Commonwealth IHP survey is an annual survey that measures and monitors healthcare system performance internationally by ranking healthcare systems through a series of performance dimensions, including quality, access, efficiency, equity and healthy lives. The IHP survey is administered via telephone in each country with nationally representative cross-sectional samples of respondents (Davis et al. 2014). The IHP survey respondent population rotates on a triennial cycle between physicians, the general population (aged 18 years or older) and older and/or sicker adults. The latter group represents the highest users of the healthcare system and comprised: those aged 18 years or older (or 55 years or older after 2011) and/or in fair or poor health; who received medical care in the past year for a serious or chronic illness, injury or disability; experienced hospitalization for something other than uncomplicated delivery of a baby in the past two years or underwent major surgery in the past two years.

Sampling frames for each survey year were uniquely designed for each participating country, with landline random-digit dialling sampling approaches typically applied. In 2013, an overlapping-frame approach (contact through landline and cell phones) was introduced to account for the increasing number of cell-phone-only households (Rapoport et al. 2013). Respondent selection within a given household was random, based on the "most recent birthday" method (i.e., respondent aged 18 years or older who had the most recent birthday). Further details of the IHP survey methodology, including sampling strategy, interview procedures, weighting of data, data editing and cleaning for each year are available elsewhere (Blendon et al. 2003; Huynh et al. 2006; Schoen et al. 2005, 2007, 2009, 2011, 2013). Because this data set is publicly available and anonymized, institutional ethics review was not required.

Study period and population

Repeated cross-sectional data from the IHP survey was examined between 2004 and 2014. The study period reflects the most recent 10-year period in which the IHP survey was administered, with the 2014 survey being the last completed survey at the time this study was initiated. Only years in which the survey respondents were either part of general population or older and/or sicker adults were selected. Survey responses from Canadian respondents were compared to those from the UK, Australia, New Zealand and the US; all five countries have consistently participated in the IHP survey throughout the entire study period. To provide context for each of the comparator countries, select characteristics of national health insurance coverage and policies are provided for each country in Appendix 1 (available at: http://www.longwoods.com/content/25192). Among countries, the UK provides the most comprehensive provision of publicly funded health services, whereas the US provides the least comprehensive. While universal public health insurance is provided in Australia and New Zealand, there are various cost-sharing mechanisms and private insurance coverage policies in place (European Observatory on Health Systems and Policies 2017). In addition, New Zealand has also been an international champion for fair-pricing policies for prescription drugs (Morgan et al. 2007). Therefore, collectively, these models offer an interesting range of comparators to assess the perceived financial barriers relative to the Canadian healthcare system.

Variables

OUTCOME DEFINITION

The outcomes of interest were defined by four survey questions that addressed potential cost-related problems to care. Specifically, the questions asked respondents if in the previous 12 months: (1) they did not fill a prescription because of costs (i.e., CRNA); (2) they had supplemental private health insurance paid through their employment or out-of-pocket; (3) they experienced serious problems paying their medical bills and (4) the extent of out-of-pocket payments made for medical treatments or services not covered through public or private insurance (e.g., costs for prescription medicines and treatments or therapies recommended by a doctor or another health professional). Binary outcome responses (i.e., 1 = yes, 0 = no) were tabulated for the first three questions, whereas the fourth question resulted in continuous outcome responses ranging in values from 1 to 999,997.

EXPOSURE AND INTERACTION TERM DEFINITION

The exposure of interest was the country of residence for a survey respondent. For each country, exposure was coded as dummy variables (e.g., 1 = Canada as country of residence, 0 = all other countries). In addition, year of survey was interacted with country of residence to explore whether temporal changes impacted the association with the outcomes of interest.

TABLE 1. Baseline characteristics for survey respondents in all countries

	Survey year							
	General population (*N* = 41,098)				**Older and/or sicker adults (*N* = 32,488)**			
Characteristics	**2004**	**2007**	**2010**	**2013**	**2005**	**2008**	**2011**	**2014**
Number of respondents								
Total	8,672	8,946	11,866	11,614	5,454	6,541	8,409	12,084
Canada	1,410	3,003	3,302	5,412	751	2,635	3,958	5,269
Australia	1,400	1,009	3,552	2,200	702	750	1,500	3,310
New Zealand	1,400	1,000	1,000	1,000	704	751	750	750
UK	3,061	1,434	1,511	1,000	1,770	1,200	1,001	1,000
US	1,401	2,500	2,501	2,002	1,527	1,205	1,200	1,755

TABLE 1. Continued

Characteristics	Survey year							
	General population (N = 41,098)				Older and/or sicker adults (N = 32,488)			
	2004	2007	2010	2013	2005	2008	2011	2014
Sex								
Males	4,671	5,323	7,380	6,509	2,260	2,312	3,048	5,073
Females	4,001	3,623	4,486	5,105	3,194	4,229	5,361	7,011
Age*								
18–24 years	638	487	639	903	279	242	282	0
25–34 years	1,448	1,174	1,407	1,501	656	602	713	0
35–49 years	2,688	2,681	2,998	2,835	1,285	1,610	1,976	0
50–64 years	2,216	2,641	3,542	3,463	1,568	2,189	2,784	5,191
≥65 years	1,682	1,963	3,280	2,912	1,623	1,898	2,654	6,893
Education§								
High school or less	3,711	3,238	4,706	4,113	2,665	2,778	3,567	5,223
Some college or university	2,569	2,837	2,996	3,861	1,518	1,968	2,371	3,431
College or university graduate or higher	2,325	2,716	3,141	3,391	281	1,669	2,274	3,093
Household income¶								
First quintile (lowest)	1,409	1,548	1,073	1,153	648	704	754	779
Second quintile	2,381	2,423	2,428	2,490	1,032	1,242	1,567	1,789
Third quintile	1,697	1,786	3,018	2,590	1,107	1,286	1,770	2,795
Fourth quintile	1,361	1,298	2,144	1,982	1,011	1,172	1,556	2,372
Fifth quintile	1,396	1,290	2,220	2,064	1,326	1,562	1,863	2,726
Not sure	208	219	285	364	210	–	282	343
Self-assessed health status†								
Excellent	1,550	1,861	2,482	2,440	382	540	773	779
Very good	3,225	3,423	4,565	4,536	935	1,338	2,003	1,789
Good	2,563	2,261	3,237	3,088	1,375	1,735	2,617	2,795
Fair	959	1,006	1,149	1,101	1,913	2,147	2,252	2,372
Poor	345	377	383	412	842	762	750	2,726
Not sure	19	12	26	21	6	16	12	343

*Total survey responses for older and/or sicker adults: 32,445. §Total survey responses for the general population: 39,604 and older and sicker adults: 30,838. ¶Total survey responses for the general population: 38,827 and older and/or sicker adults: 29,896. †Total survey responses for the general population: 41,041 and older and/or sicker adults: 31,203.

COVARIATES

We considered a number of covariates that were previously found to be independently associated with CRNA (Kennedy and Morgan 2006, 2009; Law et al. 2012) and thus may serve as potential confounders in our analyses. These covariates included age, sex, level of education, income level and self-assessed health status. All variables were included as categorical variables, as defined in Table 1.

Data analysis

The healthcare needs of the older and/or sicker adult populations were assumed to differ from those of the general population; therefore, descriptive and regression analyses were stratified by the two respondent types.

For binary outcome data, the frequency of responses were tabulated into percentages based on the total number of respondents from each country for a given survey year. The reported annual out-of-pocket expenses, expressed as continuous data, were inflation-adjusted using the domestic gross domestic product deflator for each country (World Bank 2017) and converted to 2014 US dollars using purchasing-power parities (OECD 2017b). Cost data were presented as average out-of-pocket costs plus or minus standard error by country for each survey year.

Multivariable logistic regression was used to compare the odds of CRNA, having private insurance and serious problems paying for medical bills among respondents in all five comparator countries, adjusting for year and the additional covariates described above. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) – first, controlling for the covariates alone (Model 1) and then with the interaction of year and country (Model 2) – were calculated for each country. Due to the non-normal distribution of costing data, generalized linear models using a gamma distribution and log link, adjusting for year and the additional covariates, were developed to compare the association with country and reported out-of-pocket costs for care. Regression coefficients (ß1) and 95% CIs, adjusting for both the covariates alone (Model 1) as well as with the interaction term (Model 2), were calculated (and presented as the exponentiated value) for each country. For all statistical analyses, the significance level was set at $p = 0.05$. All analyses were conducted using STATA IC V13.1 statistical software.

Results

Survey respondents

During the study period, responses to the four selected survey questions were available from the selected respondent cohorts (i.e., general population and older and/or sicker adults) in eight of the IHP survey years. The total numbers of respondents in each country and their corresponding characteristics are summarized by survey year in Table 1. Broadly from 2004 to 2014, the total number of respondents in the general population and older and/or sicker adult cohorts increased over time. The number of respondents ranged from 751 to 5,412 in Canada, 701–3,552 in Australia, 704–1,000 in New Zealand, 1,000–3,061 in the UK and 1,200–2,501 in the US (Table 1).

Overall, within the general population cohort, more of the respondents were male, between the ages of 35 and 49 years, had a high school education or less, reported a household income in the second lowest quintile and described their health to be very good (Table 1). The older and/or sicker adult cohorts differed in that most were female, older (greater than 50 years old), reported higher household incomes (highest quintile) and assessed their health status as fair to poor. In the 2014 survey, the age inclusion criterion (greater than 55 years old) omitted the inclusion of respondents between 18 and 49 years old.

Cost-related non-adherence

In Canada, the proportions of respondents experiencing CRNA in the general population were relatively stable (ranging from 7.1% to 8.9%; Table 2). In contrast, the older and/or sicker adult cohort had the highest proportions of respondents who did not fill a prescription because they could not afford it (Table 2). Specifically, 19.8% of respondents in 2005 and 12.1% in 2011 reported not filling a prescription due to cost. Between all five countries, those in the UK and the US reported the lowest and highest proportions of CRNA, respectively, in both survey cohorts (Table 2).

TABLE 2. Categorical survey responses for the general population and older and/or sicker adults in all countries

	General population				Older and/or sicker adults			
	2004	2007	2010	2013	2005	2008	2011	2014
Cost-related non-adherence, no. of respondents reporting yes (%)								
Canada	125 (8.9)	229 (7.7)	283 (8.6)	384 (7.1)	148 (19.8)	367 (13.9)	478 (12.1)	345 (6.5)
Australia	146 (10.5)	111 (11.1)	365 (10.6)	172 (7.8)	133 (19.1)	113 (15.3)	209 (14.0)	158 (4.9)
New Zealand	126 (9.0)	994 (8.4)	987 (5.4)	992 (5.6)	127 (18.1)	118 (15.8)	80 (10.7)	34 (4.6)
UK	125 (4.1)	64 (1.7)	25 (1.7)	21 (2.1)	135 (7.8)	73 (6.2)	35 (3.5)	27 (2.7)
US	251 (17.9)	507 (20.4)	444 (17.8)	361 (18.0)	566 (37.2)	405 (33.8)	286 (23.9)	244 (14.2)
Private health insurance, no. of respondents reporting yes (%)								
Canada	885 (62.8)	1,901 (63.3)	1,992 (60.3)	3,451 (63.8)	420 (55.9)	1,560 (59.2)	2,410 (60.9)	2,929 (55.6)
Australia	744 (53.4)	619 (61.7)	1,950 (55.1)	1,059 (48.5)	341 (48.6)	428 (57.4)	869 (58.2)	1,924 (60.2)
New Zealand	600 (43.4)	494 (49.8)	414 (41.8)	354 (35.9)	299 (42.9)	281 (37.7)	317 (42.4)	251 (33.9)
UK	395 (12.9)	313 (21.8)	296 (19.6)	206 (20.6)	203 (11.5)	189 (15.8)	89 (8.9)	219 (21.9)
Serious problems paying medical bills, no. of respondents reporting yes (%)								
Canada	–	129 (4.3)	175 (5.3)	296 (5.5)	–	–	258 (6.5)	267 (5.1)
Australia	–	65 (6.5)	273 (7.7)	155 (7.1)	–	–	129 (8.7)	238 (7.3)
New Zealand	–	71 (7.1)	42 (4.2)	79 (7.9)	–	–	75 (10.0)	36 (4.8)
UK	–	21 (1.5)	27 (1.8)	13 (1.3)	–	–	10 (1.0)	40 (4.0)
US	–	385 (15.4)	411 (16.4)	369 (18.4)	–	–	222 (18.5)	228 (13.0)

Compared to the UK, Canadians in the general population were 2.74 times more likely to experience CRNA (Table 3). These odds were significantly lower than in the US (OR: 7.75 [95% CI: 6.68, 8.99]), but not statistically different than those in Australia (OR: 3.38 [95% CI: 2.89, 3.95]) or New Zealand (OR: 3.03 [95% CI: 2.52, 3.66]). The odds of CRNA among the general population in Canada (OR: 1.06 [95% CI: 1.01, 1.11]) and the US (OR: 1.06 [95% CI: 1.01, 1.11]) increased over time relative to the UK; the change in CRNA over time was not significantly different for those in Australia or New Zealand (Table 3). For older and/or sicker adult respondents in Canada, Australia, New Zealand and the US, the odds of CRNA compared to those in the UK were similar to their general population counterparts. However, no significant changes over time were observed in any country (Table 3).

Supplemental private insurance

Among the four countries with universal healthcare systems, Canada consistently reported the highest proportion of respondents with supplemental private health insurance – ranging from 60.3% to 63.8% in the general population and 55.6–60.9% in older and/or sicker adults – throughout the study period (Table 2). Compared to those in the UK, Canadian respondents in the general population and older and/or sicker adult cohorts were 4.74 and 5.57 times more likely to have private insurance, respectively (Table 3). These odds were similar for respondents in Australia (general population OR: 4.79 [95% CI: 4.39, 5.22]; older and/or sicker adults OR: 6.75 [95% CI: 5.93, 7.69]) and greater than those in New Zealand (general population OR: 2.22 [95% CI: 2.00, 2.46]; older and/or sicker adults OR: 2.46 [95% CI: 2.17, 2.80]) (Table 3). Relative to the changes in the UK, the odds of having private insurance in the general population decreased over time in all other countries, yet increased over time for older and/or sicker adults in Canada and New Zealand (Table 3).

Reported serious problems paying medical bills

The percentage of Canadians reporting serious problems paying their medical bills was stable from 2007 (4.3%) to 2013 (5.5%) in the general population and from 2011 (6.5%) to 2014 (5.1%) among older and/or sicker adults; these risks are similar to the Australian and New Zealand risks (Table 1). The highest proportions of individuals reporting serious problems paying for their medical bills were among those in the US, for both the general population and older and/or sicker adults; these findings were notably different from the 4% or less of respondents in the UK over the study period (Table 1). Canadians were approximately three times more likely to have serious problems paying for medical bills compared to those in the UK (general population OR: 3.27 [95% CI: 2.48, 4.32]; older and/or sicker adults OR: 2.43 [95% CI: 1.75, 3.39]); these odds were similar for those in Australia and New Zealand (Table 3). In addition, the general population and older and/or sicker adult cohorts in the US were 12.95 and 8.97 times more likely to experience serious problems paying for their medical bills, respectively. The odds for older and/or sicker adults in the US decreased significantly over time relative to the change in the UK (Table 3).

TABLE 3. Regression of country on cost-related non-adherence, having private insurance, serious problems paying medical bills and out-of-pocket costs for care

Country	General population				Older and/or sicker adults			
	Model 1* OR (95% CI)	***p*-value**	**Model 2[§] OR (95% CI)**	***p*-value**	**Model 1* OR (95% CI)**	***p*-value**	**Model 2[§] OR (95% CI)**	***p*-value**
Cost-related non-adherence								
UK	*Referent*							
Canada	2.74 (2.36, 3.19)	<0.0001	1.06 (1.01, 1.11)	0.031	2.45 (2.10, 2.86)	<0.0001	1.00 (0.95, 1.06)	0.982
Australia	3.38 (2.89, 3.95)	<0.0001	1.03 (0.98, 1.08)	0.293	2.63 (2.23, 3.11)	<0.0001	0.96 (0.91, 1.01)	0.112
NZ	3.03 (2.52, 3.66)	<0.0001	0.98 (0.93, 1.04)	0.585	2.74 (2.27, 3.30)	<0.0001	0.96 (0.90, 1.02)	0.197
US	7.75 (6.68, 8.99)	<0.0001	1.07 (1.01, 1.12)	0.014	8.49 (7.24, 9.94)	<0.0001	0.98 (0.93, 1.03)	0.456
Private health insurance								
UK	*Referent*							
Canada	4.74 (4.37, 5.14)	<0.0001	0.83 (0.81, 0.86)	<0.0001	5.57 (5.04, 6.16)	<0.0001	1.35 (1.30, 1.40)	<0.0001
Australia	4.79 (4.39, 5.22)	<0.0001	0.95 (0.93, 0.98)	0.001	6.75 (5.93, 7.69)	<0.0001	1.01 (0.95, 1.07)	0.858
NZ	2.22 (2.00, 2.46)	<0.0001	0.90 (0.86, 0.93)	<0.0001	2.46 (2.17, 2.80)	<0.0001	1.08 (1.03, 1.14)	0.001
Serious problems paying medical bills								
UK	*Referent*							
Canada	3.27 (2.48, 4.32)	<0.0001	1.04 (1.01, 1.08)	0.023	2.43 (1.75, 3.39)	<0.0001	0.98 (0.91, 1.05)	0.498
Australia	4.53 (3.42, 6.01)	<0.0001	0.99 (0.94, 1.04)	0.628	3.52 (2.51, 4.93)	<0.0001	0.97 (0.89, 1.05)	0.434
NZ	5.40 (3.94, 7.41)	<0.0001	0.98 (0.93, 1.04)	0.567	3.48 (2.38, 5.08)	<0.0001	0.80 (0.69, 0.93)	0.004
US	12.95 (9.85, 17.0)	<0.0001	1.03 (1.01, 1.06)	0.039	8.97 (6.40, 12.57)	<0.0001	0.92 (0.85, 0.99)	0.027
Country	**Model 1* ß1 (95% CI)**	***p*-value**	**Model 2[§] ß1 (95% CI)**	***p*-value**	**Model 1* ß1 (95% CI)**	***p*-value**	**Model 2[§] ß1 (95% CI)**	***p*-value**
Out-of-pocket costs								
UK	*Referent*							
Canada	2.06 (1.72, 2.46)	<0.0001	1.02 (0.97, 1.08)	0.481	1.63 (1.33, 2.00)	<0.0001	1.05 (0.98, 1.12)	0.145
Australia	2.06 (1.70, 2.49)	<0.0001	1.06 (1.01, 1.13)	0.042	1.69 (1.36, 2.11)	<0.0001	1.06 (0.98, 1.14)	0.128
NZ	1.31 (1.06, 1.63)	0.0014	1.03 (0.96, 1.10)	0.418	1.12 (0.87, 1.42)	0.381	1.08 (1.00, 1.17)	0.051
US	4.73 (3.94, 5.70)	<0.0001	1.07 (1.01, 1.14)	0.017	3.48 (2.79, 4.33)	<0.0001	1.01 (0.95, 1.09)	0.709

CI = confidence interval; OR = odds ratio.

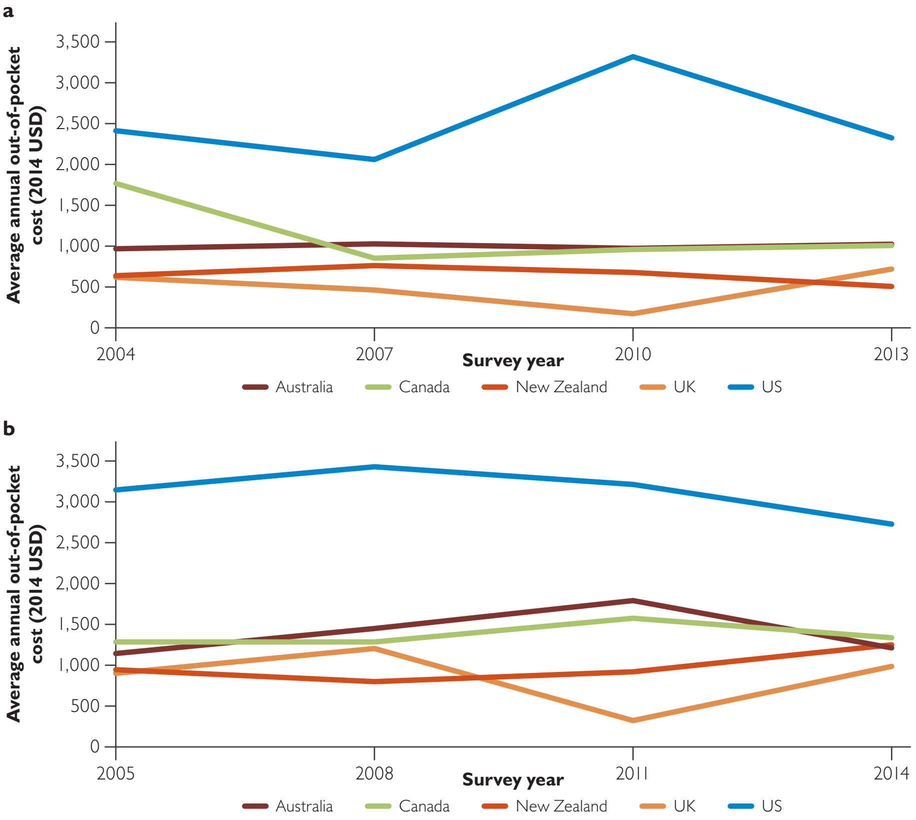
*Model 1 adjusted for age, sex, education level, income level and self-assessed health status. [§]Model 2 adjusted for year of survey, age, sex, education level, income level, self-assessed health status and interaction of country and year of survey.

Average out-of-pocket costs

Comparable average out-of-pocket costs for medical treatments and prescriptions drugs not covered by either public or private health insurance were observed among respondents in the general populations of Canada, Australia and New Zealand (Figure 1a). The reported average annual out-of-pocket costs among Canadians in the general population ranged from $852 in 2004 to $1,007 (USD) in 2013. Respondents from the UK and US reported the lowest (ranging from $172 to $719) and the highest (ranging from $2,061 to $3,319) out-of-pocket expenditures, respectively (Figure 1a). The regression analysis further confirmed that the rise in out-of-pocket expenditures was positive in all countries relative to the UK (Table 3). The rise in costs was greatest for those in the US (ß1: 4.73 [95% CI: 3.94, 5.70]) and significantly increased compared to the UK over time (ß1: 1.07 [95% CI: 1.01, 1.14]; $p = 0.017$).

The average annual out-of-pocket costs reported by older/sicker adults in Canada ranged from $1,101 in 2005 to $1,145 (USD) in 2014. Canadians, Australians and New Zealanders in this cohort also reported stable and comparable out-of-pocket expenditures (Figure 1b). Older and/or sicker adult respondents in the UK and the US reported the lowest and the highest average out-of-pocket expenses, respectively. Over the study period, costs from older and/or sicker adults in the US ranged from $2,696 in 2005 to $2,338 in 2014 (Figure 1b). The rise in out-of-pocket costs relative to the UK was positive for all countries, similar between Canada, Australia and New Zealand, and highest in the US (ß1: 3.48 [95% CI: 2.79, 4.33]). Over time, these changes in out-of-pocket costs were not significantly different than those observed in the UK (Table 3).

FIGURE 1. Average annual out-of-pocket payments for medical treatments and services reported among the (a) general population and (b) older and/or sicker adults in Canada, Australia, New Zealand, the UK and the US



Figures are inflation-adjusted using domestic gross domestic product (GDP) deflator and converted to 2014 USD using purchasing power parities. Error bars represent the standard error.

Discussion

Four outcomes addressing potential cost-related problems to care were examined using the Commonwealth Fund IHP survey data between 2004 and 2014. In Canada, we found that on average, 20% of all respondents experienced CRNA, over 50% had private health insurance and approximately 7% experienced serious problems paying for medical bills. The reported financial burden of healthcare was approximately $852–1,767 for Canadian respondents in the general population and $1,101–1,350 for older and/or sicker adults (USD). Benchmarking these metrics to the risks observed in the UK, we found that the odds of CRNA and serious problems paying for medical bills experienced by Canadians were relatively comparable to those in Australia and New Zealand, and lower than those reported by respondents in the US. Notably, relative to the UK, respondents in Canada, Australia and New Zealand were two to three times more likely to experience CRNA, and the odds were approximately eight times greater among respondents in the US. Among countries with universal healthcare systems, Canada also reported the highest proportions of respondents having supplemental private insurance. However, the odds of having supplementary private insurance relative to the UK were similar in Canada and Australia. Lastly, respondents in the US reported the largest risks of serious problems paying for medical bills, the highest average out-of-pocket costs for care as well as the greatest rise in these expenditures, which significantly increased compared to the UK over the study period.

To our knowledge, this is the first international comparison of these four potential cost-related problems to care over time using the IHP survey data. Although there have been previous studies that have identified financial barriers to care in Canada and abroad, they have been restricted to analyses of single IHP survey year data and, in particular, much focus placed on international comparisons of CRNA (Hargreaves et al. 2015; Kennedy and Morgan 2006, 2009; Morgan and Kennedy 2010; Morgan and Lee 2017; Schoen and Doty 2004). For example, Morgan and Lee (2017) examined the odds of CRNA among older and/or sicker adults in 11 countries from the 2014 survey. These authors found that respondents in the US, Canada and Australia were significantly more likely to report CRNA compared to their counterparts in the UK (Morgan and Lee 2017). The repeated cross-sectional analysis in our present study, along with the larger sample size, not only supports such findings, but also provides novel insight into how these odds of CRNA between the comparator countries have persisted over the 10-year study period.

Across all countries, the average proportion of respondents reporting serious problems paying for their medical services and treatments over the study period tended to be less than the proportion experiencing CRNA. There was insufficient information in the IHP survey responses to understand what constitutes a serious problem paying for medical bills and how that might vary across countries. It is likely that the social norms surrounding acceptability and patient understanding of out-of-pocket costs, particularly for prescription drugs, may differ across the countries (Ubel et al. 2013). For example, in the US, $1,000 out-of-pocket may be a normal, expected healthcare expense, whereas in Canada $1,000 may be perceived as an amount that constitutes an overwhelming barrier.

We examined the proportion reporting having supplementary private health insurance in countries with universal publicly funded health insurance as the coordination of the two can serve as a means to reduce the amount that patients pay out-of-pocket for health services at the point of use. We found that the majority (>50% over the study period) of Canadian respondents across almost all survey years reported having supplemental private insurance. Despite the relatively limited acknowledgement of the Canadian private health insurance market (Steinbrook 2006), these findings are in line with previous assessments of private insurance coverage among populations in Canada (Allin and Hurley 2009). Interestingly, we found that relative to the UK – which has a lesser private insurance presence – the odds of having supplementary private health insurance in Canada were not significantly different than those in Australia and New Zealand, both of which cover prescription drugs and dental services through their publicly financed healthcare systems. This suggests that the paucities in the Canadian basket of publicly funded health services may not necessarily drive the extent of private insurance coverage. This extent also raises interesting issues related to equity of access. While it is difficult to assess whether the payers of the private health insurance were the respondents themselves (i.e., out-of-pocket) or their employers, it is likely to be the latter (European Observatory on Health Systems and Policies 2017). In either case, this suggests potential barriers to care for those of lower socio-economic status that may not be able to afford private health insurance premiums or whose employment does not provide such benefits.

Despite the coordination of insurance coverage schemes, the burden of added out-of-pocket expenditures can still create barriers and inequity to access in some countries. We found that out-of-pocket costs reported by Canadian respondents were comparable to those in Australia, greater than those in the UK and New Zealand, and much less than those in the US. Interestingly, in the last two years of our study period, respondents in all countries reported notable out-of-pocket expenditures ($500–2,300) annually for their care. Considering the average household incomes among our comparator countries (OECD 2017a) (and assuming this may estimate annual household consumption), our out-of-pocket estimates are similar to the average out-of-pocket spending of 2.8% of household income consumption identified from the 2014 OECD data (OECD 2015). Such expenditures highlight the need and costs for health services that surpass that which is covered by public and private insurance means. It is difficult to determine the relative burden of differing non-insured health services, as specific expenditures were not assessed in the survey. However, reported out-of-pocket costs are likely to include prescription drugs as they were described as direct examples in this particular survey item.

Underscoring the entire discussion is the broader notion of healthcare system affordability. The concept of affordability appears to have no standardized definition. Morgan and Kennedy (2010) previously described that affordability for health technologies such as prescriptions drugs can be considered either at the level of an individual's out-of-pocket expenditures or by the overall costs incurred at the system level (Morgan and Kennedy 2010). Studies conducted specifically on the Canadian population have also correlated financial accessibility to affordability (Campbell et al. 2014; Kennedy and Morgan 2006, 2009; Law et al. 2012). For example, using data from the Canadian Community Health Survey, previous studies have identified financial barriers to care in approximately one in ten Canadians due to reports of CRNA (Campbell et al. 2014, 2017; Law et al. 2012). Assuming that the lack of a standardized definition may reflect the complexity of the concept, we argue that selecting one interpretation over another may not be appropriate. Rather, the collective outcomes assessed in our present study could all serve as key indicators of affordability, speaking to various dimensions, including unmet needs, equity of access and impact on other consumptions.

There are limitations to this work worth noting. As with any form of self-reported survey, there is the possibility for inaccuracies in the data due to recall bias of respondents. Further, the indirect assessment of respondent out-of-pocket costs for care may have also introduced measurement bias to our findings. With the increasing use of cell phones in only the more recent years of the study period, there may be selection bias in earlier survey years with greater representation of individuals with access to landlines and stable housing. Given that the composition of respondent populations differed year to year, the generalizability of the findings to the broader respective national populations and strength of trends over time are unclear.

Financial barriers to care exist in Canada and are equal to those perceived in Australia and New Zealand, yet less than in the US. Given the intense focus on equity and reducing barriers to care in Canada, this study reaffirms that financial barriers are perceived among Canadians and may limit our ability to achieve maximum health. Intervening on CRNA, as just one example of mitigation, may improve health outcomes and potentially prevent downstream use of more costly health services (Dhalla et al. 2009; Law et al. 2012). Future work should examine effective interventions, policy redesign and system redesign learning from our peer countries to minimize financial barriers to care and reduce the financial burden on Canadians.

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References

Allin, S. and J. Hurley. 2009. "Inequity in Publicly Funded Physician Care: What is the Role of Private Prescription Drug Insurance?" *Health Economics* 18(10): 1218–32.

Allin, S. and D. Watson. 2011. "The Canadian Health Care System, 2011." in Thomson, S., R. Osborn, D. Squires and S.J. Reed (eds). *International Profiles of Health Care Systems* (pp. 21–31). New York, NY, and Washington, DC: The Commonwealth Fund. Retrieved July 25, 2017. <http://www.commonwealthfund.org/~/media/files/publications/fund-report/2011/nov/1562_squires_intl_profiles_2011_11_10.pdf>.

Blendon, R.J., C. Schoen, C. DesRoches, R. Osborn and K. Zapert. 2003. "Common Concerns Amid Diverse Systems: Health Care Experiences in Five Countries." *Health Affairs* 22(3): 106–21.

Campbell, D.J., K. King-Shier, B.R. Hemmelgarn, C. Sanmartin, P.E. Ronksley, R.G. Weaver et al. 2014. "Self-Reported Financial Barriers to Care Among Patients with Cardiovascular-Related Chronic Conditions." *Health Reports* 25(5): 3.

Campbell, D.J., B.J. Manns, R.G. Weaver, B.R. Hemmelgarn, K.M. King-Shier and C. Sanmartin. 2017. "Financial Barriers and Adverse Clinical Outcomes among Patients with Cardiovascular-Related Chronic Diseases: A Cohort Study." *BMC Medicine* 15(1): 33.

Davis, K., K. Stremikis, D. Squires and C. Schoen. 2014. *Mirror, Mirror on the Wall*. Retrieved July 25, 2017. <http://www.commonwealthfund.org/~/media/files/publications/fund-report/2014/jun/1755_davis_mirror_mirror_2014.pdf>.

Daw, J.R. and S.G. Morgan. 2012. "Stitching the Gaps in the Canadian Public Drug Coverage Patchwork? A Review of Provincial Pharmacare Policy Changes from 2000 to 2010." *Health Policy* 104(1): 19–26.

Dhalla, I.A., M.A. Smith, N.K. Choudhry and A.E. Denburg. 2009. "Costs and Benefits of Free Medications after Myocardial Infarction." *Healthcare Policy* 5(2): 68–86. doi:10.12927/hcpol.2013.21176.

European Observatory on Health Systems and Policies. 2017. *Health Systems in Transition Reports*. Retrieved May 23, 2017. <http://www.euro.who.int/en/about-us/partners/observatory/publications/health-system-reviews-hits/full-list-of-country-hits>.

Gagnon, M.A. 2014. *A Roadmap to a Rational Pharmacare Policy in Canada*. Ottawa, ON: Canadian Federation of Nurses Unions.

Hargreaves, D.S., F. Greaves, C. Levay, I. Mitchell, U. Koch, T. Esch et al. 2015. "Comparison of Health Care Experience and Access between Young and Older Adults in 11 High-Income Countries." *Journal of Adolescent Health* 57(4): 413–20.

Huynh, P.T., C. Schoen, R. Osborn and A.L. Holmgren. 2006. *The US Health Care Divide: Disparities in Primary Care Experiences by Income*. New York, NY: The Commonwealth Fund.

Kennedy, J. and S. Morgan. 2006. "A Cross-National Study of Prescription Nonadherence Due to Cost: Data from the Joint Canada-United States Survey of Health." *Clinical Therapeutics* 28(8): 1217–24.

Kennedy, J. and S. Morgan. 2009. "Cost-Related Prescription Nonadherence in the United States and Canada: A System-Level Comparison Using the 2007 International Health Policy Survey in Seven Countries." *Clinical Therapeutics* 31(1): 213–19.

Law, M.R., L. Cheng, I.A. Dhalla, D. Heard and S.G. Morgan. 2012. "The Effect of Cost on Adherence to Prescription Medications in Canada." *Canadian Medical Association Journal* 184(3): 297–302.

Mendelsohn, M. 2002. *Canadians' Thoughts on their Health Care System: Preserving the Canadian Model Through Innovation*. Kingston, ON: Commission on the Future of Health Care in Canada. Retrieved July 25, 2017. <http://www.queensu.ca/cora/_files/MendelsohnEnglish.pdf>.

Morgan, S., G. Hanley, M. McMahon and M. Barer. 2007. "Influencing Drug Prices Through Formulary-Based Policies: Lessons from New Zealand." *Healthcare Policy* 3(1) 1–20. doi:10.12927/hcpol.2007.19142.

Morgan, S. and J. Kennedy. 2010. "Prescription Drug Accessibility and Affordability in the United States and Abroad." *Issue Brief (Commonwealth Fund)* 1408(89): 1–12.

Morgan, S., D. Martin, M. Gagnon, B. Mintzes, J. Daw and J. Lexchin. 2015. *Pharmacare 2020: The Future of Drug Coverage in Canada*. Vancouver, BC: Pharmaceutical Policy Research Collaboration, University of British Columbia.

Morgan, S.G. and A. Lee. 2017. "Cost-Related Non-Adherence to Prescribed Medicines among Older Adults: A Cross-Sectional Analysis of a Survey in 11 Developed Countries." *BMJ Open* 7(1): e014287.

Naylor, D., F. Girard, J. Mintz, N. Fraser, T. Jenkins and C. Power. 2015. *Unleashing Innovation: Excellent Healthcare for Canada. Report of the Advisory Panel on Healthcare Innovation*. Ottawa, ON: Health Canada. Retrieved July 25, 2017. <http://healthycanadians.gc.ca/publications/health-system-systeme-sante/report-healthcare-innovation-rapport-soins/alt/report-healthcare-innovation-rapport-soins-eng.pdf>.

Organisation for Economic Co-operation and Development (OECD). 2015. *Health at a Glance 2015: OECD Indicators*. Paris, FR: Author. doi:10.1787/health_glance-2015-en.

Organisation for Economic Co-operation and Development (OECD). 2017a. "OECD Better Life Index." Retrieved May 20, 2017. <http://www.oecdbetterlifeindex.org>.

Organisation for Economic Co-operation and Development (OECD). 2017b. "Purchasing Power Parities (PPP)." Retrieved May 2, 2017. <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>.

Rapoport, R., E. Ben-Porath and L. Tipan. 2013. *International Health Policy Survey 2013: Methodology Report*. New York, NY: Commonwealth Fund.

Schoen, C. and M.M. Doty. 2004. "Inequities in Access to Medical Care in Five Countries: Findings from the 2001 Commonwealth Fund International Health Policy Survey." *Health Policy* 67(3): 309–22.

Schoen, C., R. Osborn, M.M. Doty, M. Bishop, J. Peugh and N. Murukutla. 2007. "Toward Higher-Performance Health Systems: Adults' Health Care Experiences in Seven Countries, 2007." *Health Affairs* 26(6): w717–34.

Schoen, C., R. Osborn, S.K. How, M.M. Doty and J. Peugh. 2009. "In Chronic Condition: Experiences of Patients with Complex Health Care Needs, in Eight Countries, 2008." *Health Affairs* 28(1): w1–16.

Schoen, C., R. Osborn, P.T. Huynh, M. Doty, K. Zapert, J. Peugh and K. Davis. 2005. "Taking the Pulse of Health Care Systems: Experiences of Patients with Health Problems in Six Countries." *Health Affairs* 24: w509–25.

Schoen, C., R. Osborn, D. Squires, M. Doty, R. Pierson and S. Applebaum. 2011. "New 2011 Survey of Patients with Complex Care Needs in Eleven Countries Finds that Care is Often Poorly Coordinated." *Health Affairs* 30(12): 2437–48.

Schoen, C., R. Osborn, D. Squires and M.M. Doty. 2013. "Access, Affordability, and Insurance Complexity are Often Worse in the United States Compared to Ten Other Countries." *Health Affairs* 32(12): 2205–15.

Steinbrook, R. 2006. "Private Health Care in Canada." *New England Journal of Medicine* 354(16): 1661–64.

Ubel, P.A., A.P. Abernethy and S.Y. Zafar. 2013. "Full Disclosure—Out-of-Pocket costs as Side Effects." *New England Journal of Medicine* 369(16): 1484–86.

World Bank. 2017. "Domestic GDP Deflator." Retrieved May 2, 2017. <http://data.worldbank.org/indicator/NY.GDP.DEFL.ZS?end=2014&start=2004>.