Cancer drug expenditure in British Columbia and Saskatchewan: a trend analysis

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Abstract

Background: Expenditure on systemic therapy for cancer has been rising quickly, due to growing population, increased utilization, both in the number of users and prescription volume, and rising drug prices. Our objective was to describe trends in expenditure in British Columbia (BC) and Saskatchewan's cancer care systems, and to understand these drivers of growth.

Methods: Pharmacy dispensing records were obtained from the BC Cancer and Saskatchewan Cancer Agency pharmacies, for all anti-cancer therapies dispensed in 2006-2013. Total annual expenditure was calculated directly from the data. A trend analysis of crude and standardized annual expenditure was conducted using generalized linear models. Trends in the following components of total expenditure were estimated: cancer incidence, number of systemic therapy users per incident case, number of dispensed prescriptions per user, and cost per prescription. Analysis was stratified by patient age group, cancer site, and route of administration (oral or intravenous/other).

Results: Expenditures on systemic therapies, adjusted for population growth and ageing, increased an average of 9.2% (95% CI: 7.2, 11.2) in Saskatchewan and 6.4% (95% CI: 5.3, 7.6) in BC. Growth in expenditures on oral agents was more than two times higher than growth in intravenous/other agents. Growth rates varied significantly by cancer site. In both provinces, rising cost per prescription was the largest contributor to overall growth.

Interpretation: Price is the primary driver of growth in systemic therapy expenditure in both BC and Saskatchewan. Understanding the mechanisms of expenditure growth may inform system planning and support policy-makers' efforts to manage rising costs.

Abstract word count: 249

Introduction

Health care system expenditure on cancer drugs has been rising rapidly. Many factors contribute to this growth: the cost of new cancer therapies has increased(1, 2), systemic therapy is being used in more patients(3-5), and the pool of prevalent cancer cases has been growing due to increasing incidence(6) and improvements in survival(7). The number of new drugs being approved has accelerated alongside higher daily drug costs and longer duration of treatment(8). The use of orally-administered drugs in an outpatient setting has also been a significant change. Unlike conventional intravenous cytotoxic chemotherapy, with high-dose infusions on intermittent schedules, many oral agents are delivered at a lower daily dose over a prolonged period of time(9). With so many contributing factors, there is a strong need for health care systems to disentangle the sources of growth in cancer drug expenditures.

In Canada, understanding these trends is complicated by differences in public funding and delivery models for cancer therapy across provinces. Information on trends in systemic therapy expenditure, trends in the underlying cost drivers, and differences between provinces is not readily available to Canadian policy makers. Even among provinces with similar funding structures for systemic therapy there is variation in coverage for specific drugs, and post-coverage variation in utilization and access(10). Both British Columbia (BC) and Saskatchewan have complete and universal coverage for anti-cancer systemic therapy(11-13). The provinces share strong concordance between formularies, but also report wide variation in utilization rates for many drugs, due in part to differences in policy and uptake(10). Our study was conducted in parallel in BC and Saskatchewan to better understand variation between provinces, while minimizing differences due to funding structure. The objectives of the study are to describe trends in systemic therapy use and cost in BC and Saskatchewan from 2006 to 2013, by therapy

type and cancer site, and to identify key drivers of overall growth by isolating trends in demographics, incidence, utilization and cost.

Methods

Data Sources

We conducted secondary analysis of routinely-collected administrative data from the Saskatchewan Cancer Agency and BC Cancer Agency. In this context secondary analysis refers to analysis of data that were not collected for research purposes. Both the Saskatchewan Cancer Agency and BC Cancer Agency provide population-based cancer care services, including complete and universal coverage of systemic therapy provided according to agency guidelines(12, 13). Data were obtained from the BC Cancer Systemic Therapy Program and Saskatchewan Cancer Agency Pharmacy System for all prescriptions dispensed in 2006-2013. These databases contain dispensing records for all systemic therapy delivered to cancer patients in the province and are routinely reviewed by pharmacy staff for accuracy and quality assurance. Records for clinical trials, special access programs, and free supplies were excluded, as were drugs dispensed to pediatric patients or patients with benign disease. Supportive care drugs (e.g., anti-emetics) were excluded from the analysis using each province's respective classification. Drug ingredient cost was available directly from the data and adjusted to 2013 Canadian dollars(14). Drugs were classified by route of administration as oral or intravenous (IV)/other. We generated a preliminary list of orally-administered drugs in Saskatchewan, and additional drugs appearing in the BC data were added following review (Appendix 1).

Dispensing records were linked with patient-level data from the BC Cancer Registry(15) and the Saskatchewan Cancer Registry(16) using unique patient identifiers. Patient characteristics obtained from

registry data included age at dispensing date, sex, and primary cancer site(6). For patients diagnosed with multiple primary cancers, the last diagnosis before their first prescription in the observation period was used. Primary cancer site was intended as a proxy for the indication of therapy, because indication was not available from the data. Aggregate cancer incidence, by age, sex and cancer site for 2006-2013 was also obtained from the BC and Saskatchewan Cancer Registries.

Population effects

Total annual expenditure, prescription volume, and number of unique systemic therapy users was calculated in each province. Adjusted totals were calculated using the 2006 provincial population from Statistics Canada(17) as the reference population. Annual mean per capita expenditure by age was re-weighted to the reference population size and age distribution(18), to adjust for population growth and ageing in each province.

Components of growth

To investigate the trends underlying overall growth, total expenditure was separated into independent components using the following identity, adapted from McGrail *et al.*(19):

$$\frac{expenditure}{population} = \frac{incident\ cases}{population} \times \frac{systemic\ therapy\ users}{incident\ cases} \times \frac{\#\ of\ prescriptions}{systemic\ therapy\ users} \times \frac{expenditure}{\#\ of\ prescriptions} \quad (1)$$

Growth in expenditure for the population was separated into four components: from left, growth in population cancer incidence, times growth in the number of systemic therapy recipients per incident case, times growth in the number of prescriptions per user, times growth in the cost per prescription[1].

Incidence, total number of users, prescription volume and expenditure were direct standardized by age and sex(20), weighted to the pooled population of BC and Saskatchewan for 2013 using census

[1] For example, 10% growth in expenditure for the population could be made up of 2.5% growth in each of the components as follows: 1.025 × 1.025 × 1.025 × 1.025 = 1.10

estimates from Statistics Canada(17). Annual percent change in expenditure and in each component of Equation 1 was estimated using generalized linear models with a log-link and gamma distribution, to directly estimate the relative growth and to account for the skewed distribution of count and cost data. Models were stratified by drug route of administration, age group, and cancer site (female breast, colorectal, lung, prostate, and other)(6). Analysis was done in SAS 9.3 (SAS Institute, Carey NC).

Results

From 2006 to 2013, 2.1 million prescriptions for systemic therapy were dispensed in BC and 585,476 prescriptions were dispensed in Saskatchewan (Table 1). In BC, breast cancer was the most common indication, while in Saskatchewan it was colorectal cancer. Over 30% of dispensed prescriptions in both provinces had an oral route of administration.

Population effects

Crude expenditure increased an average of 11.2% per year (95% CI: 9.3, 13.1) in Saskatchewan and 9.2% per year (95% CI: 8.0, 10.3) in BC, from approximately $25M and $119M in 2006 to $54M and $205M in 2013, in Saskatchewan and BC respectively (Supplementary Table S1). Prescription volume and the number of systemic therapy users also increased over the study period (Figure 1). Growth in expenditure and prescription volume was higher in Saskatchewan than in BC (Figure 1).

In BC, 23% of the increase in expenditure observed from 2006-2013 was attributable to population growth, and a further 16% was attributable to population ageing. In Saskatchewan, population growth accounted for 21% of the increase in expenditure, with 2.2% attributable to ageing (Figure 2). After age and population adjustment, systemic therapy expenditure rose an average of 9.2% (95% CI: 7.2, 11.2) per year in Saskatchewan and 6.4% (95% CI: 5.3, 7.6) per year in BC.

Components of growth

The components of age-sex standardized expenditure growth are shown for BC and Saskatchewan in Tables 2 and 3 respectively. Growth in cost per dispensed prescription was the largest component of overall expenditure growth, at 3.2% (95% CI: 2.5, 3.9) per year in BC and 4.7% (95% CI: 3.5, 6.0) per year in Saskatchewan. Both provinces also had increases in the number of systemic therapy users per incident case, and the number of dispensed prescriptions per user. Growth in expenditure for oral agents was higher than for drugs with other routes of administration, at 16.5% per year (95% CI: 13.6, 19.6) and 13.1% per year (95% CI: 10.7, 15.6) in Saskatchewan and BC respectively.

Stratified analysis by cancer site and age group revealed significant variability in trends. In BC, expenditure on oral drugs for breast cancer decreased over the study period (-11.4% per year, 95% CI: -17.8, -4.5), while in Saskatchewan expenditure was unchanged. In both provinces, the greatest increase was seen in oral drugs for prostate cancer: incidence decreased and the number of systemic therapy users and prescriptions increased slightly, while cost per dispensed prescription, grew annually by 20.6% (95% CI: 4.8, 38.7) in BC and 31.6% (95% CI: 12.9, 53.4) in Saskatchewan. Both provinces also showed a trend of increasing expenditure on oral agents in older age groups, but this effect largely disappears after adjusting for both age group and indication (Supplementary Table S2 and S3)

Interpretation

Average annual growth in expenditure for systemic therapy, at 11.2% in Saskatchewan and 9.2% in BC between 2006 and 2013, outpaced growth in the number of users and prescription volume. After accounting for population growth and ageing, the increase in expenditure on systemic therapy agents remained significant, roughly doubling in Saskatchewan and increasing by half in BC over the study period. In Canada, the average annual growth in wholesale purchases of cancer drugs by hospitals was 15.2% per year between 2004/05 and 2009/10, with the majority of the growth attributed to purchase

of newer, high-cost treatments, as opposed to price changes, volume effects, or population growth(2). Similar patterns have been observed in the United States for oral anti-cancer drugs, where spending increased by 37% and utilization increased by 10% between 2006 and 2011(21). While seniors account for a disproportionate amount of health care expenditure, due to higher morbidity and health service utilization, populating ageing has only a modest effect on growth. CIHI's National Health Expenditure Trends report estimates growth in overall health expenditure attributable to ageing as only 0.9% per year(22). Ageing in particular had little impact on expenditure in Saskatchewan. Recent census data indicates that Saskatchewan's population is growing more quickly than BC's, and is significantly younger(23). Comparing the two provinces, overall growth in expenditure was higher in Saskatchewan than it was for BC. Per-capita expenditure in BC was slightly higher than in Saskatchewan at the start of observation in 2006, as observed previously(10), and decreased from 2006 to 2007, exaggerating the difference in growth rates. Changes in indication for two major drugs in BC, bevacizumab for colorectal cancer and trastuzumab for breast cancer, led to reduced expenditure in 2007

Our stratified analysis revealed significant variability in trends. Growth in expenditure was fastest for oral drugs in both provinces, due in part to a change in the product mix over time. A US study found biologics increased from 35% to 59% of total oral anti-cancer drug spending from 2006 to 2011, while hormonal agents fell from 42% to 19%(21). Generic hormonal agents became available over the study period, reflected in the decrease in cost observed in the oral breast cancer drugs. Growth was largest for lung cancer and "other" cancers, reflecting recent changes in therapies for less common cancers. Between 2005 and 2014, the majority of new oncology drugs were for rarer indications, including renal cancer, lymphoma, and chronic myelogenous leukemia(8). Growth in total expenditure was highest in the older age groups, particularly for oral drugs. There is a perception that oral agents have reduced toxicity(9, 24) and as a result we might expect to see increased utilization among older patients who

may not otherwise be candidates for systemic therapy; however, the number of users and prescription volume increased at roughly the same rate among older and younger patients.

Isolating the underlying trends reveals that the largest growth is observed in cost per dispensed prescription, at 3% and 5% per year in all drugs and 8% and 11% per year for oral drugs, in BC and Saskatchewan respectively. The unit cost of drugs, particularly for oral drugs, is responsible for the most growth in expenditure. Growth was especially high in prostate cancer due to the introduction of abiraterone, an orally-administered CYP17 inhibitor, toward the end of the study period. The exception to this pattern was colorectal cancer, where the observed growth in all other components exceeded the growth in cost for oral systemic therapy. Most oral therapy for colorectal cancer was with capecitabine, where utilization steadily increased over time.

What is the value that healthcare systems are realizing on systemic therapy spending? Measuring value for money is outside the scope of the current analysis, but is central to understanding the implications of these trends. Growth in systemic therapy expenditure may be appropriate if therapeutic benefit to patients is growing correspondingly; however, there is mounting evidence that patient benefit is decreasing over time relative to price(25). The list price of new anti-cancer drugs has increased by 12% per year for drugs approved in the US between 1996 and 2014(1). In the UK, daily drug cost increased from £50/day (approximately CAD$90/day) for drugs introduced in 2000-2004, to £144/day (CAD$270/day)in 2005-2009 and £160/day (CAD$300/day) in 2010-2014(8). Cost-effectiveness ratios have been rising over time for newly-approved anti-cancer drugs, with an estimated US$54,100 per year of life for drugs launched in 1995 and US$207,000 per year of life for drugs launched in 2013, an increase of nearly four-fold(1). Rising prices are attributable in part to reference pricing, where a product's launch price is set incrementally higher than existing therapies, and to compensating for mandated or negotiated discounts(1). At a threshold of US$100,000 per year of life, net benefit for total

drug expenditure at current levels remains positive, but as expenditure growth outpaces therapeutic benefit value for money diminishes(26).

This study has a number of limitations arising from the use of administrative data. Our analysis uses a patient's last diagnosis as a proxy for indication of therapy, and there may be some misclassification in cases where patients with multiple primary cancers are receiving treatment for the earlier diagnosis. Data on specific indications (for example, adjuvant vs. palliative indications) would provide additional insight into drug utilization. Administrative data also cannot provide important contextual information, such as the impact of provider practice patterns, patient preference, or shared decision-making on these trends. Patients tend to prefer oral agents for convenience and comfort(24), but managing adherence and monitoring toxicity may be more challenging for patients administering oral therapy at home(9, 27). Understanding these factors with qualitative or mixed-methods research would provide important insight into the trends observed here. Our results are also limited by the time frame of our analysis. New therapies are adopted by cancer agencies on an ongoing basis. Since 2013, the largest change to the systemic therapy landscape has been the introduction of immune checkpoint inhibitors for the treatment of several cancers. The expenditure trends we observed will have likely continued beyond 2013 with the use of these and other novel systemic therapy agents, but this should be confirmed with additional years of observation. Additional data would also allow for a more sophisticated time-series or joinpoint analysis, where changes in the growth rate over time are identified using segmented regression(28). Our study has too few time points to implement these methods(29); consequently, this analysis assumes a constant rate of change, and cannot identify changes in growth associated with specific policy changes or time-varying factors. Finally, the cost information in our data does not reflect negotiated volume discounts or rebates from manufacturers. Data from Europe indicate actual prices can be as much as 58% lower than list price(30). Our analysis therefore overestimates expenditures, but

the magnitude of this effect is unknown due to the confidential nature of these negotiated pricing agreements.

Expenditure on systemic therapy drugs for cancer is increasing over time; our analysis indicates the largest contributor to this growth is price, reflected in the cost per dispensed prescription. While the magnitude of this growth and balance between the cost drivers varies by cancer type, similar patterns were observed in BC and Saskatchewan, and these findings are likely generalizable across Canadian jurisdictions. Understanding the drivers of health care expenditure is only the first step toward assessing the value of services and setting priorities for the allocation of scarce resources.

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Figure captions

Figure 1 – Unadjusted growth in number of users, prescriptions, and expenditure in British Columbia and Saskatchewan, relative to 2006. Growth in Saskatchewan is represented by solid lines (SK in legend); growth in British Columbia is represented by dashed lines (BC in legend).

Figure 2 – Growth in expenditure, adjusted for population growth and ageing, in British Columbia and Saskatchewan, relative to 2006. Growth in Saskatchewan is represented by solid lines (SK in legend); growth in British Columbia is represented by dashed lines (BC in legend).

Appendix 1

Oral systemic therapy drugs:

abiraterone
acitretin
anagrelide
anastrozole
bicalutamide
bromocriptine
busulfan
cabergoline
capecitabine
chlorambucil
clodronate
crizotinib
cyclophosphamide
cyclosporine
cyproterone
dasatinib
enzalutamide
erlotinib
estramustine
etoposide
everolimus
exemestane
fludarabine
flutamide
gefitinib
hydroxyurea
imatinib
isotretinoin
lapatinib
lenalidomide
letrozole
lomustine
medroxyprogesterone
megestrol
melphalan
mercaptopurine
methotrexate
mitotane
nilotinib
nilutamide
pazopanib
prednisolone
prednisone
procarbazine
quinagolide
ruxolitinib
sorafenib
sunitinib
tamoxifen
temozolomide
thalidomide
thioguanine
tretinoin
vemurafenib
vismodegib

Figure 1 – Unadjusted growth in number of users, prescriptions, and expenditure in British Columbia and Saskatchewan, relative to 2006. Growth in Saskatchewan is represented by solid lines (SK in legend); growth in British Columbia is represented by dashed lines (BC in legend).

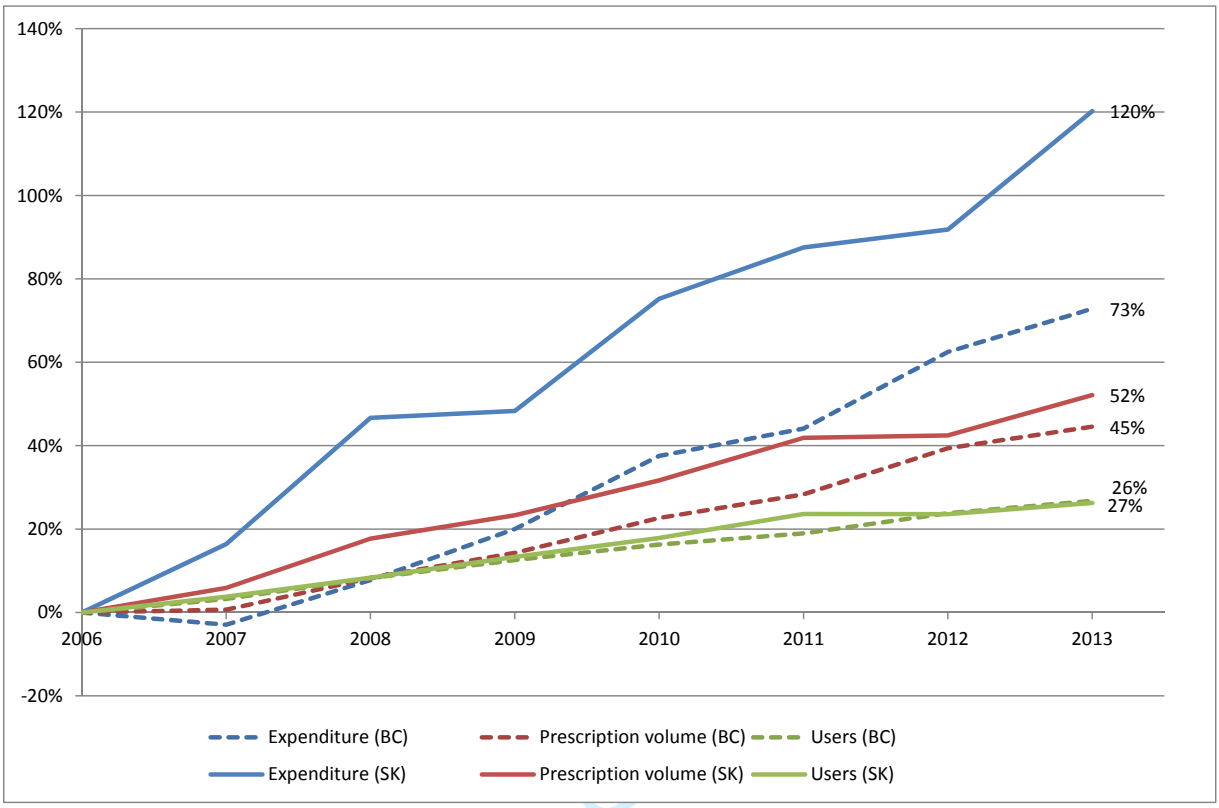

Figure 2 – Growth in expenditure, adjusted for population growth and ageing, in British Columbia and Saskatchewan, relative to 2006. Growth in Saskatchewan is represented by solid lines (SK in legend); growth in British Columbia is represented by dashed lines (BC in legend).

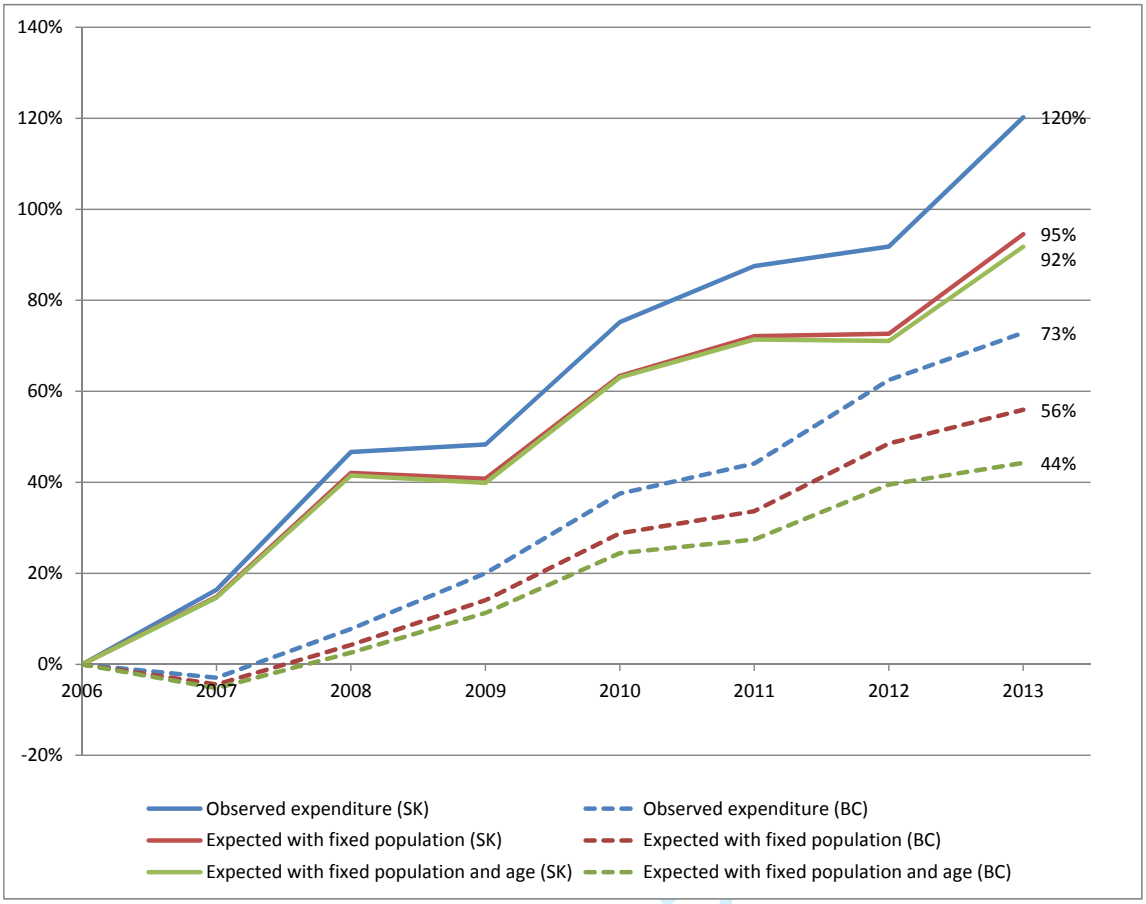

Table 1 - Unique systemic therapy users and systemic therapy prescription characteristics by province, 2006-2013

		British Columbia		Saskatchewan	
Dispensed prescriptions		N	% (95% CI)	N	% (95% CI)
Total		2,100,947		585,476	
Route	Oral	688,522	32.8 (32.7-32.8)	202,071	34.5 (34.4-34.6)
	Other	1,412,425	67.2 (67.2-67.3)	383,405	65.5 (65.4-65.6)
Indication	Breast	573,376	27.3 (27.2-27.4)	124,971	21.3 (21.2-21.5)
	Colorectal	420,224	20.0 (19.9-20.1)	176,161	30.1 (30.0-30.2)
	Lung	106,866	5.1 (5.1-5.1)	33,995	5.8 (5.7-5.9)
	Prostate	197,864	9.4 (9.4-9.5)	51,813	8.8 (8.8-8.9)
	Other	802,617	38.2 (38.1-38.3)	198,536	33.9 (33.8-34.0)
Patient characteristics		N	% (95% CI)	N	% (95% CI)
Total		103,680		23,108	
Sex	Male	48,240	46.5 (46.2-46.8)	11,240	48.6 (48.0-49.3)
	Female	55,510	53.5 (53.2-53.8)	11,868	51.4 (50.7-52.0)
Age	<50 years	13,619	13.1 (12.9-13.3)	2,733	11.8 (11.4-12.2)
	50-59	20,196	19.5 (19.2-19.7)	4,453	19.3 (18.8-19.8)
	60-69	28,377	27.4 (27.1-27.6)	6,184	26.8 (26.2-27.3)
	70-79	26,501	25.6 (25.3-25.8)	6,385	27.6 (27.1-28.2)
	≥80 years	14,987	14.5 (14.2-14.7)	3,353	14.5 (14.1-15.0)
Age in years	Mean (SD)	64.9 (13.6)	64.8-65.0	65.5 (13.3)	65.3-65.7
Cancer site	Breast	29,552	28.5 (28.2-28.8)	6,059	26.2 (25.7-26.8)
	Colorectal	9,861	9.5 (9.3-9.7)	2,354	10.2 (9.8-10.6)
	Lung	7,624	7.4 (7.2-7.5)	2,081	9.0 (8.6-9.4)
	Prostate	17,516	16.9 (16.7-17.1)	4,233	18.3 (17.8-18.8)
	Other	39,127	37.7 (37.4-38.0)	8,381	36.3 (35.6-36.9)

Abbreviations: SD, standard deviation; CI, confidence interval

Table 2 - Annual percent change by component in British Columbia

		Change in total expenditure per capita	Change in cancer incidence per capita*	Change in users per incident case	Change in prescriptions per user	Change in cost per prescription
		% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Total		**6.6 (5.4, 7.7)**	-0.4 (-1.1, 0.3)	**1.4 (0.8, 2.1)**	**2.2 (1.7, 2.7)**	**3.2 (2.5, 3.9)**
Oral agents		**13.1 (10.7, 15.6)**	-0.4 (-1.1, 0.3)	**2.0 (1.4, 2.6)**	**3.0 (2.7, 3.3)**	**8.1 (6.0, 10.2)**
IV (other) agents		**3.8 (2.7, 5.0)**	-0.4 (-1.1, 0.3)	**1.5 (0.8, 2.2)**	**1.5 (1.0, 2.0)**	**1.2 (0.6, 1.9)**
Oral	Breast	**-11.4 (-17.8, -4.5)**	**1.1 (0.1, 2.2)**	0.0 (-1.1, 1.0)	**0.9 (0.4, 1.3)**	**-13.0 (-19.1, -6.6)**
	Colorectal	**5.7 (3.4, 8.2)**	0.3 (-0.4, 0.9)	**3.4 (1.7, 5.1)**	**2.8 (1.6, 3.9)**	-0.7 (-1.6, 0.3)
	Lung	**12.6 (9.7, 15.6)**	**-1.6 (-2.4, -0.8)**	**8.5 (6.3, 10.7)**	**1.3 (0.2, 2.4)**	**4.0 (2.7, 5.4)**
	Prostate	**26.4 (9.3, 46.2)**	**-4.0 (-5.7, -2.4)**	**3.3 (1.8, 4.8)**	**5.7 (4.3, 7.2)**	**20.6 (4.8, 38.7)**
	Other	**19.7 (15.1, 24.4)**	0.5 (-0.3, 1.3)	**3.2 (2.2, 4.1)**	**4.3 (3.6, 4.9)**	**10.7 (7.2, 14.3)**
IV	Breast	-1.3 (-2.8, 0.2)	**1.1 (0.1, 2.2)**	0.9 (-0.3, 2.0)	**-0.6 (-1.1, -0.1)**	**-2.6 (-3.4, -1.8)**
	Colorectal	**6.1 (3.0, 9.3)**	0.3 (-0.4, 0.9)	**2.6 (1.4, 3.8)**	-0.2 (-1.0, 0.7)	**3.4 (1.2, 5.7)**
	Lung	**11.7 (8.2, 15.3)**	**-1.6 (-2.4, -0.8)**	1.0 (-0.4, 2.4)	**0.7 (0.5, 0.9)**	**11.6 (8.5, 14.7)**
	Prostate	**-2.5 (-3.1, -2.0)**	**-4.0 (-5.7, -2.4)**	**2.8 (1.6, 3.9)**	**1.3 (1.0, 1.6)**	**-2.4 (-2.9, -1.8)**
	Other	**8.0 (6.5, 9.5)**	0.5 (-0.3, 1.3)	**2.3 (1.2, 3.3)**	**1.3 (0.5, 2.1)**	**3.7 (2.5, 5.0)**
Oral	< 50 years	7.4 (-14.5, 34.9)	**1.4 (0.4, 2.3)**	**1.9 (1.4, 2.4)**	**2.6 (2.2, 3.0)**	1.3 (-0.2, 2.9)
	50-59 years	11.8 (-5.5, 32.3)	0.4 (-0.3, 1.1)	**1.1 (0.4, 1.9)**	**3.0 (2.3, 3.6)**	**6.9 (3.7, 10.2)**
	60-69 years	14.5 (-1.9, 33.6)	-0.7 (-1.7, 0.3)	**2.3 (1.3, 3.3)**	**2.9 (2.4, 3.5)**	**9.4 (6.5, 12.4)**
	70-79 years	**16.1 (1.9, 32.2)**	-0.4 (-1.1, 0.2)	**1.7 (1.2, 2.2)**	**3.3 (3.0, 3.7)**	**11.0 (8.7, 13.4)**
	≥ 80 years	**13.8 (0.9, 28.3)**	**-1.4 (-2.4, -0.3)**	**2.5 (1.5, 3.5)**	**3.1 (2.7, 3.5)**	**9.2 (7.0, 11.5)**
IV	< 50 years	2.0 (-14.0, 20.9)	**1.4 (0.4, 2.3)**	0.3 (-0.7, 1.4)	-0.5 (-1.1, 0.2)	0.8 (-0.2, 1.8)
	50-59 years	2.2 (-9.3, 15.2)	0.4 (-0.3, 1.1)	0.6 (-0.3, 1.6)	0.1 (-0.6, 0.7)	**1.2 (0.2, 2.1)**
	60-69 years	3.4 (-5.4, 12.9)	-0.7 (-1.7, 0.3)	**1.5 (0.5, 2.6)**	**1.1 (0.7, 1.6)**	**1.4 (0.5, 2.4)**
	70-79 years	6.5 (-3.6, 17.6)	-0.4 (-1.1, 0.2)	**1.7 (1.2, 2.2)**	**3.8 (3.3, 4.3)**	**1.3 (0.5, 2.0)**
	≥ 80 years	5.8 (-10.3, 24.8)	**-1.4 (-2.4, -0.3)**	**2.4 (1.5, 3.4)**	**4.4 (3.0, 5.9)**	0.3 (-0.6, 1.1)

Standardized to pooled British Columbia and Saskatchewan population for 2013

*does not change with route of administration

Table 3 - Annual percent change by component in Saskatchewan

		Change in total expenditure per capita	Change in cancer incidence per capita*	Change in users per incident case	Change in prescriptions per user	Change in cost per prescription
		% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Total		**9.2 (7.2, 11.2)**	0.2 (-0.3, 0.6)	**1.9 (1.2, 2.5)**	**2.2 (1.8, 2.6)**	**4.7 (3.5, 6.0)**
Oral agents		**16.5 (13.6, 19.6)**	0.2 (-0.3, 0.6)	**2.0 (1.1, 2.9)**	**3.2 (1.8, 4.6)**	**10.6 (7.8, 13.5)**
IV/other agents		**6.7 (4.6, 8.8)**	0.2 (-0.3, 0.6)	**2.0 (1.3, 2.7)**	**1.4 (0.7, 2.1)**	**2.9 (1.9, 4)**
Oral	Breast	**10.8 (4.9, 17.1)**	0.4 (-0.3, 1.2)	3.0 (1.3, 4.7)	2.0 (-0.3, 4.2)	5.3 (-0.2, 11.0)
	Colorectal	**6.5 (2.7, 10.4)**	**4.4 (3.0, 5.8)**	3.2 (0.0, 6.5)	**8.0 (5.8, 10.2)**	**-8.4 (-10.5, -6.2)**
	Lung	**24.3 (4.0, 48.5)**	0.3 (-0.7, 1.3)	**4.0 (1.3, 6.8)**	0.4 (-1.1, 2.0)	**19.6 (0.8, 41.9)**
	Prostate	**31.9 (12.0, 55.4)**	**-4.9 (-7.3, -2.4)**	**3.2 (0.9, 5.4)**	1.4 (-1.6, 4.5)	**31.6 (12.9, 53.4)**
	Other	**16.9 (13.0, 21.0)**	0.2 (-0.8, 1.2)	**1.2 (0.1, 2.4)**	**4.2 (3.1, 5.4)**	**10.6 (6.6, 14.6)**
IV	Breast	-2.8 (-6.0, 0.5)	0.4 (-0.3, 1.2)	-0.7 (-2.4, 1.1)	0.4 (-0.9, 1.6)	**-2.8 (-4.6, -0.9)**
	Colorectal	**14.0 (7.8, 20.6)**	**4.4 (3.0, 5.8)**	-1.5 (-4.3, 1.3)	0.2 (-0.8, 1.2)	**10.6 (6.8, 14.6)**
	Lung	**11.8 (8.2, 15.6)**	0.3 (-0.7, 1.3)	1.8 (-0.2, 3.8)	**1.5 (0.2, 2.9)**	**7.8 (5.7, 9.9)**
	Prostate	1.0 (-1.0, 3.0)	**-4.9 (-7.3, -2.4)**	**6.1% (3.1, 9.1)**	**4.1 (2.9, 5.3)**	**-3.7 (-5.1, -2.4)**
	Other	**10.6 (8.8, 12.4)**	0.2 (-0.8, 1.2)	**4.1 (3.2, 5.1)**	1.3 (0.0, 2.7)	**4.6 (3.0, 6.1)**
Oral	< 50 years	14.1 (-11.4, 46.9)	**1.6 (0.5, 2.6)**	**3.9 (3.0, 4.9)**	**1.9 (0.0, 3.7)**	**5.6 (3.9, 7.4)**
	50-59 years	13.5 (-6.5, 37.9)	-0.7 (-1.9, 0.6)	**3.5 (1.6, 5.6)**	**3.9 (1.9, 5.9)**	6.5 (-0.6, 14.2)
	60-69 years	**20.3 (3.7, 39.5)**	**-1.0 (-1.6, -0.4)**	**4.6 (3.2, 6.0)**	**3.6 (1.7, 5.5)**	**12.1 (9.4, 14.9)**
	70-79 years	**18.7 (4.2, 35.2)**	**1.0 (0.1, 1.9)**	0.6 (-0.7, 2.0)	**2.1 (0.6, 3.5)**	**14.5 (12.7, 16.3)**
	≥ 80 years	11.4 (-1.4, 25.8)	0.6 (-0.4, 1.7)	**-4.0 (-5.9, -2.2)**	**1.6 (0.0, 3.2)**	**13.8 (8.0, 19.9)**
IV	< 50 years	6.3 (-12.1, 28.6)	**1.6 (0.5, 2.6)**	0.8 (-0.3, 1.9)	**3.0 (1.2, 4.7)**	0.8 (-1.0, 2.7)
	50-59 years	7.4 (-4.3, 20.4)	-0.7 (-1.9, 0.6)	**2.8 (1.4, 4.3)**	**2.2 (1.0, 3.4)**	**2.8 (1.6, 4.0)**
	60-69 years	6.5 (-1.6, 15.1)	**-1.0 (-1.6, -0.4)**	**2.8 (1.3, 4.4)**	1.0 (-0.4, 2.4)	**3.5 (2.5, 4.5)**
	70-79 years	8.2 (-1.7, 19.2)	**1.0 (0.1, 1.9)**	**1.8 (0.9, 2.8)**	0.6 (-0.9, 2.2)	**4.5 (3.2, 5.8)**
	≥ 80 years	0.5 (-14.0, 17.5)	0.6 (-0.4, 1.7)	0.9 (-0.6, 2.3)	-2.3 (-4.6, 0.1)	1.2 (-2.1, 4.7)

Standardized to pooled British Columbia and Saskatchewan population for 2013

*does not change with route of administration

Supplementary Table S1 - Total systemic therapy expenditure, prescription volume, and number of users by year, 200

	British Columbia			Saskatchewan		
	Expenditure	Prescription volume	Users	Expenditure	Prescription volume	Users
2006	119,009,671	219,227	26,875	24,501,738	57,673	5,928
2007	115,535,452	220,740	27,747	28,521,196	61,080	6,154
2008	128,270,693	237,430	29,093	35,942,647	67,890	6,423
2009	142,838,050	250,612	30,257	36,345,382	71,118	6,719
2010	163,691,852	268,975	31,261	42,935,143	75,956	6,987
2011	171,535,815	281,408	31,979	45,952,956	81,830	7,328
2012	193,387,901	305,602	33,282	47,003,157	82,174	7,327
2013	205,722,695	316,953	34,069	53,965,596	87,755	7,485

Expenditure expressed in 2013 Canadian dollars

Supplementary Table S2 - stratified models (British Columbia)

			Change in total expenditure per capita	Change in cancer incidence per capita*	Change in users per incident case	Change in prescriptions per user	Change in cost per prescription
			% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Total	Breast		**-3.5 (-4.5, -2.5)**	**1.1 (0.1, 2.2)**	-0.1 (-1.1, 0.9)	**0.7 (0.2, 1.2)**	**-5.1 (-6.0, -4.2)**
	Colorectal		**6.1 (3.4, 8.8)**	0.3 (-0.4, 0.9)	**2.1 (1.2, 3.0)**	**0.8 (0.4, 1.2)**	**2.8 (0.8, 4.9)**
	Lung		**12.1 (10.4, 13.9)**	**-1.6 (-2.4, -0.8)**	**2.6 (1.3, 3.8)**	0.2 (-0.4, 0.9)	**10.8 (9.2, 12.4)**
	Prostate		1.0 (-0.8, 2.8)	**-4.0 (-5.7, -2.4)**	**2.5 (1.2, 3.8)**	**3.5 (2.8, 4.1)**	-0.7 (-2.5, 1.2)
	Other		**12.7 (11.4, 14.0)**	0.5 (-0.3, 1.3)	**2.0 (1.1, 3.0)**	**2.6 (1.8, 3.3)**	**7.3 (6.2, 8.3)**
Total	< 50 years		**3.6 (2.2, 4.9)**	**1.4 (0.4, 2.3)**	**0.9 (0.1, 1.7)**	0.1 (-0.6, 0.8)	**1.2 (0.3, 2.2)**
	50-59 years		**5.0 (3.7, 6.3)**	0.4 (-0.3, 1.1)	0.4 (-0.4, 1.2)	**1.3 (0.5, 2.1)**	**2.9 (1.9, 3.9)**
	60-69 years		**6.6 (5.1, 8.0)**	-0.7 (-1.7, 0.3)	**1.7 (0.7, 2.7)**	**1.8 (1.2, 2.3)**	**3.7 (2.8, 4.6)**
	70-79 years		**9.3 (8.1, 10.5)**	-0.4 (-1.1, 0.2)	**1.5 (1.0, 2.1)**	**3.8 (3.4, 4.3)**	**4.2 (3.4, 5.0)**
	≥ 80 years		**8.2 (7.2, 9.1)**	**-1.4 (-2.4, -0.3)**	**2.0 (1.1, 3.0)**	**4.1 (3.5, 4.8)**	**3.2 (2.3, 4.1)**
Fully stratified models							
Oral	Breast	< 50 years	**-6.5 (-9.9, -3.1)**	-0.3 (-1.7, 1.1)	**2.9 (1.8, 4.0)**	**0.8 (0.1, 1.5)**	**-9.7 (-12.5, -6.7)**
		50-59 years	**-14.0 (-19.6, -8.0)**	0.8 (-0.3, 2.0)	-0.5 (-1.7, 0.8)	**0.8 (0.1, 1.5)**	**-14.9 (-21.0, -8.4)**
		60-69 years	**-11.0 (-18.0, -3.3)**	**1.9 (0.4, 3.4)**	-0.8 (-2.2, 0.7)	**1.0 (0.4, 1.6)**	**-12.7 (-19.6, -5.4)**
		70-79 years	**-10.6 (-17.7, -2.8)**	**2.9 (1.2, 4.5)**	-1.0 (-2.3, 0.3)	**1.8 (1.2, 2.4)**	**-13.6 (-20.1, -6.7)**
		≥ 80 years	**-11.9 (-19.7, -3.4)**	-0.3 (-1.9, 1.3)	0.1 (-2.1, 2.4)	-0.2 (-2.0, 1.6)	**-11.4 (-17.7, -4.8)**
	Colorectal	< 50 years	2.4 (-3.2, 8.2)	**6.2 (4.1, 8.4)**	3.7 (-0.1, 7.7)	**3.3 (0.9, 5.7)**	**-10.2 (-13.6, -6.7)**
		50-59 years	**11.0 (7.4, 14.8)**	**1.6 (0.2, 3.1)**	**6.0 (3.7, 8.5)**	**2.5 (0.7, 4.5)**	0.5 (-0.5, 1.5)
		60-69 years	**7.0 (2.6, 11.6)**	-0.7 (-1.4, 0.1)	**4.6 (0.6, 8.8)**	**2.0 (0.2, 3.8)**	0.9 (-1.0, 2.9)
		70-79 years	1.9 (-0.2, 4.0)	-0.4 (-1.3, 0.5)	0.6 (-1.0, 2.4)	**2.2 (1.1, 3.3)**	-0.5 (-2.0, 0.9)
		≥ 80 years	**6.3 (2.5, 10.2)**	-0.2 (-1.7, 1.4)	**3.1 (1.3, 5.0)**	**3.5 (1.3, 5.7)**	-0.1 (-2.7, 2.6)
	Lung	< 50 years	**17.7 (10.1, 25.9)**	-4.3 (-8.5, 0.1)	**18.7 (13.7, 23.9)**	1.5 (-2.6, 5.8)	**3.1 (0.4, 5.8)**
		50-59 years	**7.9 (5.4, 10.5)**	-1.7 (-3.6, 0.2)	**9.3 (6.5, 12.1)**	1.6 (-0.8, 4.2)	-1.3 (-4.3, 1.9)
		60-69 years	**14.6 (9.9, 19.5)**	**-2.5 (-3.2, -1.7)**	**9.0 (5.5, 12.5)**	2.1 (-0.9, 5.3)	**5.4 (2.7, 8.2)**
		70-79 years	**9.5 (7.3, 11.8)**	-0.9 (-1.9, 0.1)	**6.8 (4.3, 9.3)**	-0.3 (-2.6, 2.0)	**3.6 (1.3, 6.0)**
		≥ 80 years	**22.0 (16.1, 28.3)**	-1.1 (-2.4, 0.2)	**9.0 (4.2, 13.9)**	2.3 (-2.3, 7.1)	**10.1 (4.7, 15.8)**
	Prostate	< 50 years	**45.4 (17.2, 80.4)**	-4.4 (-9.4, 1.0)	**10.5 (4.7, 16.7)**	0.4 (-4.6, 5.6)	**36.1 (11.6, 66.0)**
		50-59 years	10.9 (-0.2, 23.2)	-2.0 (-3.9, 0.0)	0.3 (-2.3, 3.0)	**5.0 (2.1, 8.0)**	6.9 (-1.4, 15.9)
		60-69 years	**26.2 (8.3, 47.0)**	**-4.2 (-6.5, -1.9)**	2.0 (-0.3, 4.3)	**4.3 (2.5, 6.0)**	**23.7 (7.3, 42.6)**
		70-79 years	**26.4 (9.3, 46.2)**	**-4.0 (-5.7, -2.4)**	**2.2 (1.0, 3.4)**	**5.6 (3.7, 7.6)**	**22.0 (6.2, 40.2)**
		≥ 80 years	**29.7 (10.3, 52.5)**	**-5.4 (-7.0, -3.8)**	**6.9 (5.3, 8.6)**	**6.6 (5.3, 7.9)**	**20.5 (2.6, 41.5)**
	Other	< 50 years	**8.9 (6.6, 11.2)**	**1.9 (0.8, 3.1)**	**2.3 (0.9, 3.7)**	**3.4 (2.5, 4.4)**	0.9 (-0.9, 2.8)
		50-59 years	**20.4 (15.5, 25.5)**	**1.1 (0.3, 1.8)**	**4.3 (3.2, 5.4)**	**4.7 (3.5, 5.9)**	**9.1 (5.4, 13.0)**
		60-69 years	**22.7 (16.8, 29.0)**	0.8 (-0.4, 1.9)	**3.6 (2.3, 4.9)**	**4.5 (3.7, 5.2)**	**12.6 (8.1, 17.3)**
		70-79 years	**25.4 (19.8, 31.3)**	0.5 (-0.3, 1.2)	**2.3 (1.4, 3.3)**	**4.2 (2.9, 5.5)**	**17.4 (12.4, 22.5)**
		≥ 80 years	**18.7 (12.8, 24.8)**	-1.1 (-2.3, 0.2)	**3.5 (2.3, 4.7)**	**4.0 (2.6, 5.4)**	**11.5 (5.7, 17.5)**
IV	Breast	< 50 years	**-2.8 (-4.2, -1.3)**	-0.3 (-1.7, 1.1)	1.2 (-0.4, 2.8)	**-1.3 (-2.1, -0.5)**	**-2.3 (-3.3, -1.3)**
		50-59 years	**-2.8 (-4.6, -1.0)**	0.8 (-0.3, 2.0)	0.8 (-0.7, 2.4)	-1.1 (-2.3, 0.0)	**-3.2 (-4.4, -2.0)**
		60-69 years	**-1.5 (-2.7, -0.3)**	**1.9 (0.4, 3.4)**	0.1 (-1.4, 1.6)	0.0 (-0.6, 0.7)	**-3.4 (-4.4, -2.4)**
		70-79 years	**7.0 (3.0, 11.2)**	**2.9 (1.2, 4.5)**	**3.3 (0.8, 5.9)**	0.6 (-0.7, 1.8)	0.4 (-1.4, 2.2)
		≥ 80 years	**16.3 (6.6, 26.7)**	-0.3 (-1.9, 1.3)	2.3 (-0.3, 5.0)	**7.4 (3.9, 10.9)**	6.8 (-1.6, 16.0)
	Colorectal	< 50 years	**5.1 (1.9, 8.4)**	**6.2 (4.1, 8.4)**	-1.9 (-4.3, 0.6)	-2.0 (-3.4, -0.7)	**3.0 (0.7, 5.3)**
		50-59 years	**5.0 (2.2, 7.8)**	**1.6 (0.2, 3.1)**	-0.7 (-1.7, 0.2)	0.3 (-0.7, 1.3)	**3.9 (2.0, 5.8)**
		60-69 years	**4.6 (1.0, 8.4)**	-0.7 (-1.4, 0.1)	**2.3 (0.8, 3.9)**	-0.2 (-1.5, 1.1)	**3.2 (0.6, 5.9)**
		70-79 years	**9.8 (7.0, 12.6)**	-0.4 (-1.3, 0.5)	**5.4 (3.6, 7.1)**	0.3 (-0.7, 1.4)	**4.2 (1.5, 6.9)**
		≥ 80 years	**13.8 (7.6, 20.4)**	-0.2 (-1.7, 1.4)	**6.7 (2.5, 11.1)**	**5.3 (2.4, 8.2)**	**1.6 (0.1, 3.2)**
	Lung	< 50 years	**14.7 (9.3, 20.4)**	-4.3 (-8.5, 0.1)	**5.5 (2.2, 8.9)**	-2.4 (-3.9, -1.0)	**17.5 (14.1, 20.9)**
		50-59 years	**8.0 (2.5, 13.8)**	-1.7 (-3.6, 0.2)	-0.5 (-2.8, 2.0)	0.0 (-0.7, 0.7)	**10.4 (6.0, 15.1)**
		60-69 years	**11.3 (6.9, 15.8)**	**-2.5 (-3.2, -1.7)**	1.2 (0.0, 2.4)	**0.7 (0.0, 1.3)**	**11.9 (8.3, 15.5)**
		70-79 years	**13.3 (9.9, 16.8)**	-0.9 (-1.9, 0.1)	**1.8 (0.4, 3.2)**	**2.1 (1.3, 2.9)**	**10.0 (6.4, 13.6)**
		≥ 80 years	**20.2 (7.7, 34.1)**	-1.1 (-2.4, 0.2)	**3.3 (1.4, 5.2)**	**4.3 (2.5, 6.2)**	**12.8 (1.7, 25.2)**
	Prostate	< 50 years	-4.9 (-11.1, 1.8)	-4.4 (-9.4, 1.0)	**6.3 (2.0, 10.9)**	0.1 (-12.8, 14.9)	-2.8 (-10.3, 5.4)
		50-59 years	**-4.2 (-5.2, -3.3)**	-2.0 (-3.9, 0.0)	-0.8 (-3.1, 1.6)	**1.9 (0.1, 3.7)**	**-3.3 (-4.5, -2.2)**
		60-69 years	**-3.4 (-4.0, -2.8)**	**-4.2 (-6.5, -1.9)**	**2.3 (0.2, 4.5)**	**1.4 (1.0, 1.9)**	**-2.7 (-3.2, -2.2)**
		70-79 years	**-3.0 (-3.7, -2.4)**	**-4.0 (-5.7, -2.4)**	**1.8 (0.9, 2.8)**	**1.4 (0.7, 2.0)**	**-2.1 (-2.9, -1.3)**
		≥ 80 years	**-1.2 (-2.0, -0.4)**	**-5.4 (-7.0, -3.8)**	**5.7 (3.9, 7.6)**	**1.2 (0.7, 1.8)**	**-2.4 (-3.0, -1.7)**
	Other	< 50 years	**6.9 (4.6, 9.3)**	**1.9 (0.8, 3.1)**	0.2 (-1.6, 2.1)	0.1 (-1.0, 1.2)	**4.6 (3.1, 6.2)**
		50-59 years	**5.8 (4.2, 7.4)**	**1.1 (0.3, 1.8)**	1.0 (-0.2, 2.1)	0.1 (-1.2, 1.3)	**3.6 (2.3, 5.0)**
		60-69 years	**6.2 (4.3, 8.1)**	0.8 (-0.4, 1.9)	**1.6 (0.4, 3.0)**	**1.0 (0.3, 1.7)**	**2.7 (1.0, 4.4)**
		70-79 years	**10.4 (8.6, 12.3)**	0.5 (-0.3, 1.2)	**3.6 (2.5, 4.6)**	**3.3 (2.4, 4.1)**	**2.7 (1.2, 4.3)**
		≥ 80 years	**14.0 (11.3, 16.8)**	-1.1 (-2.3, 0.2)	**3.9 (2.6, 5.2)**	**4.4 (2.8, 6.1)**	**6.2 (4.2, 8.2)**

Standardized to pooled BC and SK population for 2013

*does not change with route of administration

Supplementary Table S3 - stratififed models (Saskatchewan)

			Change in total expenditure per capita	Change in cancer incidence per capita*	Change in users per incident case	Change in prescriptions per user	Change in cost per prescription
			% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Total	Breast		-0.2 (-3.5, 3.1)	0.4 (-0.3, 1.2)	**2.8 (1.2, 4.5)**	0.1 (-1.9, 2.1)	**-3.4 (-5.8, -0.9)**
	Colorectal		**13.5 (7.6, 19.7)**	**4.4 (3.0, 5.8)**	-1.0 (-3.4, 1.6)	0.3 (-1.0, 1.7)	**9.3 (5.7, 13.1)**
	Lung		**14.4 (10.1, 18.9)**	0.3 (-0.7, 1.3)	**2.2 (0.3, 4.1)**	**1.5 (0.4, 2.5)**	**10.1 (7.7, 12.7)**
	Prostate		**4.6 (2.2, 7.1)**	**-4.9 (-7.3, -2.4)**	**3.5 (0.8, 6.3)**	**4.4 (2.7, 6.2)**	**1.8 (1.2, 2.3)**
	Other		**13.3 (11, 15.6)**	0.2 (-0.8, 1.2)	**2.6 (1.7, 3.5)**	**2.9 (1.9, 3.8)**	**7.1 (5.3, 9.0)**
Total	< 50 years		**8.3 (6.1, 10.6)**	**1.6 (0.5, 2.6)**	**3.3 (2.3, 4.4)**	1.1 (-0.2, 2.3)	**2.1 (0.6, 3.7)**
	50-59 years		**8.9 (5.6, 12.2)**	-0.7 (-1.9, 0.6)	**3.6 (1.9, 5.3)**	**2.2 (1.5, 2.9)**	**3.6 (1.2, 6.1)**
	60-69 years		**9.7 (7.0, 12.5)**	**-1.0 (-1.6, -0.4)**	**3.6 (2.3, 5.0)**	**1.6 (0.7, 2.6)**	**5.2 (4.0, 6.5)**
	70-79 years		**10.8 (9.8, 11.9)**	**1.0 (0.1, 1.9)**	0.8 (-0.1, 1.7)	**1.8 (1.1, 2.4)**	**7.0 (6.0, 7.9)**
	≥ 80 years		**3.6 (2.0, 5.1)**	0.6 (-0.4, 1.7)	**-2.9 (-4.5, -1.3)**	0.9 (-0.7, 2.6)	**5.0 (2.9, 7.2)**
Fully stratified models							
Oral	Breast	< 50 years	**20.2 (13.9, 26.9)**	0.3 (-2.1, 2.8)	**6.4 (3.2, 9.7)**	**1.2 (0.3, 2.1)**	**11.2 (7.0, 15.6)**
		50-59 years	**9.5 (1.3, 18.5)**	**-2.6 (-3.9, -1.2)**	**5.1 (2.4, 7.9)**	**2.1 (0.1, 4.1)**	5.0 (-2.1, 12.5)
		60-69 years	**11.7 (4.2, 19.7)**	0.5 (-1.1, 2.2)	**4.1 (1.4, 6.9)**	1.8 (-1.3, 5.0)	5.1 (-1.3, 12)
		70-79 years	**11.5 (7.7, 15.4)**	**4.4 (2.8, 6.0)**	-1.2 (-3.4, 1.0)	2.5 (0.0, 5.0)	**5.8 (1.3, 10.6)**
		≥ 80 years	-3.7 (-7.8, 0.7)	0.2 (-2.4, 2.8)	-2.4 (-5.7, 1.1)	2.2 (-0.4, 4.8)	-3.4 (-8.7, 2.3)
	Colorectal	< 50 years	**7.9 (3.5, 12.4)**	**7.0 (1.4, 12.8)**	7.5 (-1.0, 16.8)	**7.9 (2.9, 13.2)**	**-12.7 (-16.3, -9.0)**
		50-59 years	**11.4 (7.0, 15.9)**	**4.6 (2.3, 6.9)**	**9.3 (6.7, 11.9)**	**7.4 (3.7, 11.2)**	**-9.3 (-10.9, -7.8)**
		60-69 years	5.4 (-3.6, 15.2)	**4.4 (2.2, 6.8)**	3.6 (-2.3, 9.8)	**10.5 (6.8, 14.4)**	**-11.2 (-14.7, -7.6)**
		70-79 years	3.1 (-1.6, 8.0)	**5.4 (3.0, 7.9)**	-0.6 (-4.8, 3.8)	**5.9 (2.5, 9.4)**	**-6.6 (-7.9, -5.2)**
		≥ 80 years	**12.6 (2.9, 23.2)**	**2.2 (0.5, 3.9)**	1.5 (-6.3, 10.0)	**8.3 (5.3, 11.5)**	-0.5 (-3.7, 2.9)
	Lung	< 50 years	**41.2 (17.0, 70.4)**	-0.6 (-6.3, 5.4)	0.5 (-4.4, 5.6)	4.0 (-3.4, 11.9)	**35.0 (6.6, 70.9)**
		50-59 years	**27.6 (2.0, 59.5)**	-2.1 (-5.2, 1.2)	**9.3 (5.3, 13.4)**	**4.0 (1.1, 7.1)**	16.3 (-4.0, 40.8)
		60-69 years	14.4 (-4.0, 36.3)	**-2.5 (-3.9, -1.1)**	2.8 (-0.5, 6.3)	-1.5 (-4.4, 1.5)	15.2 (-3.5, 37.6)
		70-79 years	**27.4 (2.3, 58.7)**	**3.9 (2.5, 5.2)**	**4.4 (1.0, 8.0)**	1.4 (-2.0, 5.0)	18.6 (-1.8, 43.1)
		≥ 80 years	**35.4 (9.2, 67.7)**	0.6 (-1.7, 2.9)	**11 (0.9, 22.1)**	2.0 (-5.7, 10.3)	**24.8 (0.9, 54.4)**
	Prostate	< 50 years	**-27.6 (-41.7, -10.0)**	4.8 (-5.2, 15.8)	**-11.3 (-18.0, -4.0)**	**-22 (-26.4, -17.3)**	-3.7 (-21.6, 18.2)
		50-59 years	**56.2 (32.6, 84.1)**	**-4.2 (-7.0, -1.3)**	4.0 (-0.6, 8.8)	**3.8 (0.4, 7.3)**	**49.2 (27.5, 74.5)**
		60-69 years	**47.6 (24.5, 74.9)**	**-4.6 (-7.0, -2.2)**	**6.1 (2.8, 9.6)**	**6.1 (1.9, 10.6)**	**36.0 (16.0, 59.4)**
		70-79 years	**36.8 (13.2, 65.3)**	**-7.1 (-10.7, -3.3)**	**6.2 (3.6, 8.8)**	2.1 (-1.3, 5.7)	**34.2 (12.0, 60.7)**
		≥ 80 years	1.7 (-11.5, 16.7)	**-2.7 (-4.2, -1.1)**	**-3.2 (-5.0, -1.4)**	**-6.4 (-7.6, -5.2)**	**14.8 (0.3, 31.4)**
	Other	< 50 years	**12.1 (8.8, 15.5)**	1.4 (0.0, 2.8)	1.6 (-0.2, 3.4)	**3.8 (1.2, 6.5)**	**4.7 (1.5, 8.1)**
		50-59 years	**13.1 (2.6, 24.7)**	0.0 (-1.6, 1.6)	**2.4 (0.1, 4.8)**	**5.0 (2.3, 7.8)**	6.0 (-2.1, 14.8)
		60-69 years	**22.2 (19.2, 25.2)**	-1.2 (-2.3, -0.1)	**4.3 (2.6, 6.0)**	**5.2 (2.1, 8.5)**	**12.3 (8.4, 16.3)**
		70-79 years	**18.7 (15.2, 22.2)**	0.3 (-1.2, 1.9)	0.8 (-0.8, 2.4)	0.2 (-1.6, 2.1)	**17.1 (14.3, 20.0)**
		≥ 80 years	**20.3 (9.3, 32.5)**	0.9 (-0.4, 2.2)	**-4.1 (-6.7, -1.4)**	**4.2 (1.6, 6.9)**	**20.4 (9.7, 32.1)**
IV	Breast	< 50 years	-0.4 (-4.7, 4.2)	0.3 (-2.1, 2.8)	1.5 (-1.3, 4.4)	0.6 (-1.0, 2.3)	-2.8 (-6.1, 0.6)
		50-59 years	**-3.9 (-6.6, -1.1)**	**-2.6 (-3.9, -1.2)**	0.0 (-1.5, 1.6)	1.1 (-0.2, 2.5)	**-2.4 (-4.4, -0.4)**
		60-69 years	-4.5 (-9.5, 0.7)	0.5 (-1.1, 2.2)	-1.3 (-3.7, 1.2)	0.0 (-2.1, 2.1)	**-3.6 (-6.6, -0.6)**
		70-79 years	1.1 (-5.6, 8.2)	**4.4 (2.8, 6.0)**	-0.8 (-6.1, 4.7)	-2.1 (-4.7, 0.7)	-0.1 (-2.5, 2.4)
		≥ 80 years	-8.8 (-29.2, 17.6)	0.2 (-2.4, 2.8)	0.2 (-2.5, 3.1)	-2.9 (-9.4, 4.0)	-6.5 (-23.3, 14.1)
	Colorectal	< 50 years	**20.6 (11.8, 30.1)**	**7.0 (1.4, 12.8)**	1.7 (-4.8, 8.6)	**3.4 (0.1, 6.8)**	**7.8 (4.0, 11.7)**
		50-59 years	**17.6 (12.7, 22.8)**	**4.6 (2.3, 6.9)**	0.6 (-2.1, 3.2)	0.2 (-1.3, 1.8)	**11.6 (7.9, 15.5)**
		60-69 years	**12.7 (3.5, 22.8)**	**4.4 (2.2, 6.8)**	-1.7 (-5.9, 2.8)	-0.7 (-2.6, 1.2)	**10.6 (5.5, 16.0)**
		70-79 years	**10.9 (5.0, 17.1)**	**5.4 (3.0, 7.9)**	-4.5 (-9.0, 0.3)	-1.2 (-2.7, 0.4)	**11.5 (8.2, 15.0)**
		≥ 80 years	**-15.8 (-24.6, -5.8)**	**2.2 (0.5, 3.9)**	**-12.6 (-18.1, -6.7)**	-3.5 (-11.8, 5.5)	-1.5 (-9.9, 7.6)
	Lung	< 50 years	**20.8 (10.4, 32.3)**	-0.6 (-6.3, 5.4)	1 (-3.5, 5.6)	5.6 (-0.1, 11.5)	**13.9 (5.1, 23.4)**
		50-59 years	**11.7 (5.9, 17.8)**	-2.1 (-5.2, 1.2)	**6.4 (4.1, 8.8)**	1.7 (-1.2, 4.7)	**5.0 (0.9, 9.4)**
		60-69 years	**5.2 (2.2, 8.2)**	**-2.5 (-3.9, -1.1)**	-0.3 (-2.6, 2.0)	0.1 (-2.3, 2.6)	**8.0 (4.8, 11.3)**
		70-79 years	**20.9 (11.7, 30.9)**	**3.9 (2.5, 5.2)**	**4.1 (1.5, 6.9)**	**3.2 (1.0, 5.6)**	**8.0 (1.9, 14.5)**
		≥ 80 years	**13.8 (0.7, 28.5)**	0.6 (-1.7, 2.9)	3.9 (-2.8, 11.1)	4.1 (-1.1, 9.6)	5.2 (-3.0, 14.1)
	Prostate	< 50 years	-11 (-26.4, 7.8)	4.8 (-5.2, 15.8)	**-14 (-25.9, -0.1)**	**-11.7 (-21.0, -1.3)**	**11.0 (2.7, 20.0)**
		50-59 years	-1.9 (-5.5, 1.8)	**-4.2 (-7.0, -1.3)**	3.1 (-1.2, 7.6)	2.4 (-1.4, 6.3)	-2.7 (-5.6, 0.3)
		60-69 years	**4.1 (2.0, 6.2)**	**-4.6 (-7.0, -2.2)**	**7.1 (3.1, 11.3)**	**5.5 (4.4, 6.6)**	**-3.3 (-4.6, -2.0)**
		70-79 years	0.5 (-2.2, 3.2)	**-7.1 (-10.7, -3.3)**	**7.9 (4.3, 11.5)**	**4.5 (3.0, 6.1)**	**-4.3 (-5.9, -2.7)**
		≥ 80 years	-0.9 (-2.5, 0.8)	**-2.7 (-4.2, -1.1)**	**3.7 (1.4, 6.1)**	**2.3 (0.7, 3.9)**	**-3.9 (-5.1, -2.6)**
	Other	< 50 years	**6.6 (3.1, 10.1)**	1.4 (0.0, 2.8)	0.6 (-0.7, 1.9)	0.9 (-1.0, 2.9)	**3.6 (0.9, 6.5)**
		50-59 years	**12.9 (9.7, 16.1)**	0.0 (-1.6, 1.6)	**4.8 (2.5, 7.2)**	1.6 (-0.3, 3.6)	**5.9 (3.3, 8.5)**
		60-69 years	**10.0 (7.7, 12.4)**	-1.2 (-2.3, -0.1)	**5.5 (3.1, 7.8)**	**2.2 (0.1, 4.3)**	**3.2 (1.0, 5.6)**
		70-79 years	**13.2 (10.9, 15.5)**	0.3 (-1.2, 1.9)	**5.5 (3.7, 7.3)**	2.0 (-0.2, 4.3)	**4.6 (2.2, 7.2)**
		≥ 80 years	**7.4 (0.8, 14.5)**	0.9 (-0.4, 2.2)	**3.8 (2.6, 5.1)**	-2.7 (-6.2, 1.0)	5.7 (0.0, 11.8)

Standardized to pooled BC and SK population for 2013

*does not change with route of administration