

THE VALUE OF MEDICINES IN CANADA

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ABSTRACT

Spending on drugs has become a target for cost-containment measures because of its continual growth, both in absolute terms and as a proportion of overall healthcare expenditures. However, considering drug spending in isolation from other healthcare components neglects the benefit of drugs to Canada's healthcare system, society and economy. Drugs, when used appropriately as part of overall disease management, have increased life expectancy and quality of life, have avoided more costly alternatives such as hospitalisation and surgery, and have decreased worker absenteeism and increased their productivity. Current evidence suggests that drugs represent good value for money and are an integral part of a cost-effective and sustainable healthcare system. Cost-containment measures should focus on appropriate use of medications and improving adherence to therapeutic regimens for optimal patient outcomes.

See also Editorials/Commentaries: **Mintzes B, Lexchin J. Do higher drugs costs lead to better health?** *Can J Clin Pharmacol* Vol 12(1) Winter 2005:e22-e27; Jan. 7, 2005

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Canadians are spending ever increasing sums on healthcare. Because the proportion of all healthcare dollars attributed to pharmaceuticals has been steadily increasing¹ and because drug costs are easily measured, cost-containment strategies have focused on drug spending.² But is rising drug spending necessarily undesirable?

Beyond their acquisition cost, drugs have an inverse economic relationship with other healthcare resources, such as hospital spending. The benefit of drugs to personal health, health-related quality of life and productivity also needs to be considered. As observed in the Romanow Commission report on the future of healthcare in Canada, prescription drugs "have fundamentally changed the face of healthcare in Canada," protecting against illness, curing previously fatal diseases, managing chronic health conditions, and replacing the need for some intensive interventions.³ Thus, containment of drug spending must be balanced with evidence-based information that demonstrates the overall value of pharmaceuticals.

Measuring the cost-effectiveness of health and medical interventions has been an active and expanding research field over the past decade, with considerable focus on pharmaceuticals. It is important to recognise the distinction between a cost-effective and cost-saving pharmaceutical intervention. A drug that is "cost-saving" is one that saves more money than it costs to

administer. "Cost-effective" drugs include cost-saving drugs and also drugs that do not save money but have added value because their health benefits are judged to merit the additional cost.⁴

The objective of this paper is to discuss some of the evidence supporting the value of drugs to Canadians, the healthcare system and society. This will include examination of the factors affecting drug spending, and presentation of examples of the health and economic benefits of pharmaceuticals.

METHODS

A review of the healthcare literature was undertaken to identify potential factors affecting drug spending in Canada, and to identify studies assessing the value of medicines to patients, the healthcare system and Canadian society. A biomedical database (PubMed) was searched using the keyword or phrases healthcare, cost, burden of illness, pharmaceuticals, quality of life, and cost-effectiveness. To identify important publications not yet captured in searches, key journals such as the Canadian Medical Association Journal and Health Affairs were hand-searched and bibliographies of retrieved articles were screened. Healthcare web sites explored for relevant reports and datasets included the Canadian Institute for Health Information (www.cihi.ca), the OECD (www.oecd.org), Health Canada (www.hc-sc.gc.ca), and Statistics Canada (www.statscan.ca).

Articles were selected based on their timeliness and relevance to the subject.

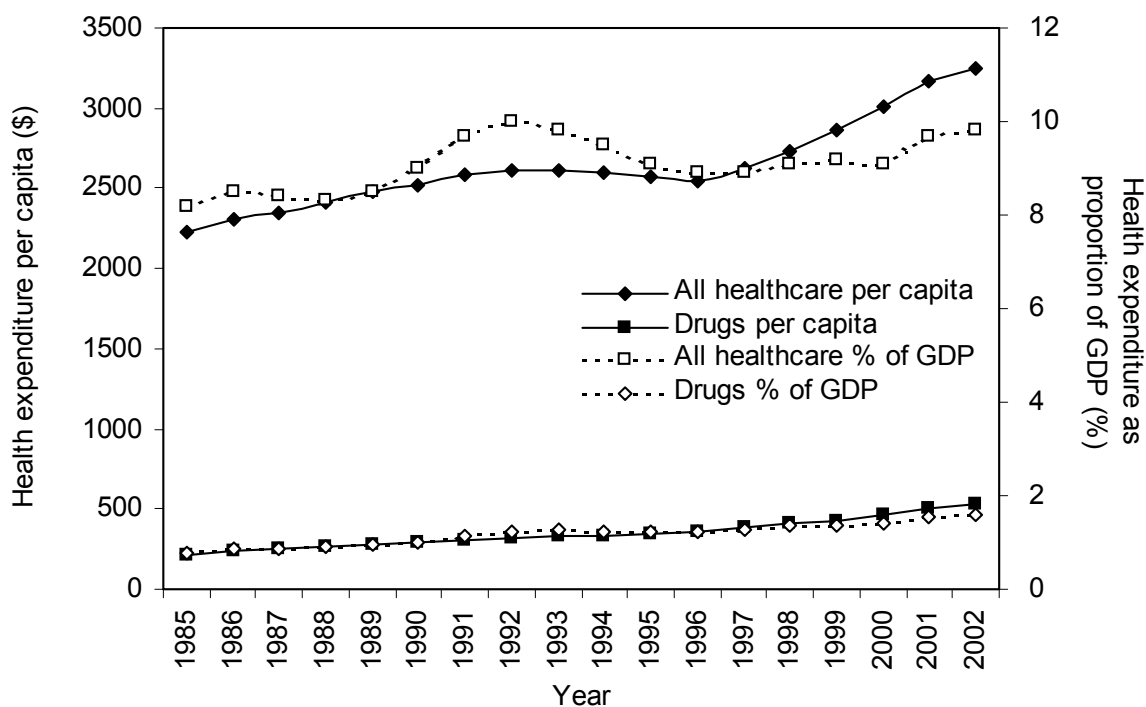
Drug Expenditures in Canada

In 2002, Canadians spent an estimated \$112 billion on healthcare, representing 9.8% of the country's Gross Domestic Product (GDP) and \$3572 per person.⁵ Figure 1 shows that although healthcare expenditures have increased since 1985, when both health spending and the strength of the economy are considered, overall healthcare spending as a percentage of GDP has remained relatively stable. Indeed, Canada now spends a smaller percentage of its GDP on healthcare than it did in 1992.⁶

Hospital expenditures accounted for the largest share of Canadian healthcare spending in

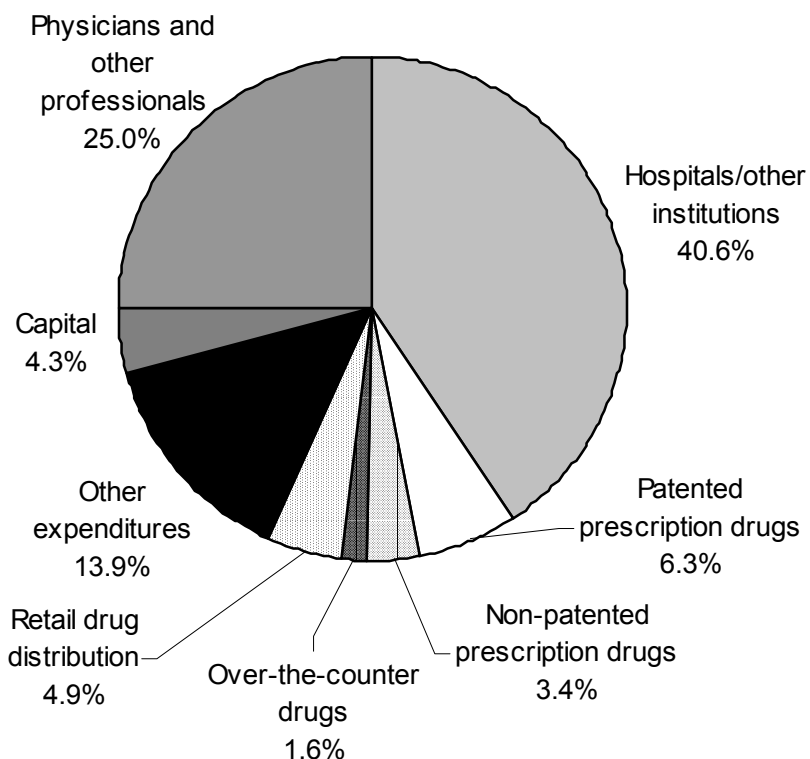
2002 (31.3%), followed by drug costs (16.2%) and physician services (13.4%).⁵ In 2000-2001, 31% of spending on drugs was paid by provincial and territorial governments, with the remaining 69% paid by private insurance or out-of-pocket.⁷ Prescription drugs account for approximately 80% of pharmaceutical expenditures, over-the-counter (OTC) drugs the remaining 20%.⁵ Figure 2 breaks this down further to show that 30% of pharmaceutical expenditure is consumed by retail distribution costs, including dispensing fees and mark-ups, leaving 39% to pay the price of patented prescription drugs, 21% for non-patented prescription drugs, and 10% for OTC drugs.⁸ In 1998, the average Canadian household spent \$198 out-of-pocket on prescription drugs and \$131 on OTC medications.⁹

Figure 1 Total healthcare and drug expenditures in Canada from 1985 to 2002



Per capita expenditures are in constant 1997 dollars. Values for 2001 and 2002 are forecast (adapted from Canadian Institute for Health Information 2002⁵).

Figure 2 Breakdown of healthcare spending in Canada (total \$112 billion) estimated for 2002 (adapted from Rx&D 2003⁸).

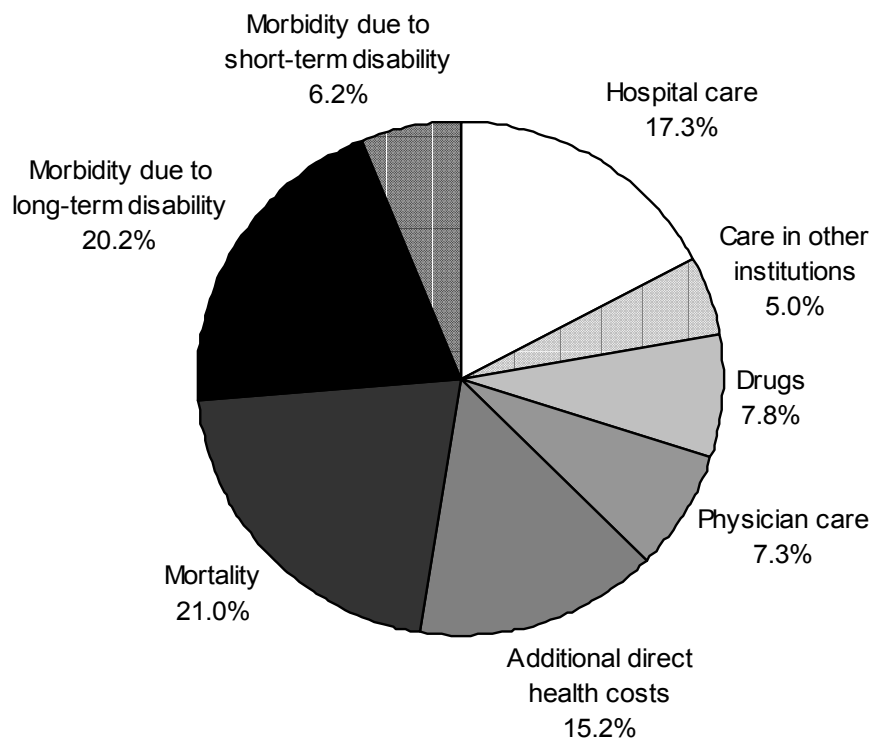


Other institutions include nursing homes and residential care facilities; over-the-counter includes personal health products; other expenditures include medical transportation, hearing aids and appliances, occupational health and voluntary health associations; retail distribution includes pharmacy professional fees and mark-ups; non-patented prescription drugs include generic drugs

Drug expenditures are a minor component of the total economic burden of illness in Canada, which was estimated to be \$159.4 billion in 1998.¹⁰ This burden incorporates not only direct costs due to disease, such as hospital and physician services and drugs, but also the often hidden indirect costs, including death and lost productivity due to disability. Spending on

prescription and OTC drugs accounted for 7.8% of this burden, greatly exceeded by hospital care at 17.3% and indirect societal costs due to death and disability at 47.3% (Figure 3).¹⁰ Spending on prescription and OTC drugs continues to represent a small fraction of the Canadian economy: less than 1.6% of GDP in 2002.⁵ In other words, Canadians spend less than 2 cents of every dollar on all pharmaceuticals.

Figure 3: Cost components of the total economic burden of illness in Canada 1998 (total \$159.4 billion; adapted from Health Canada 2002¹⁰).



Other institutions include nursing homes and residential care facilities; additional direct health costs include spending on services of non-physician healthcare professionals (e.g., dentists and physiotherapists), public health, and healthcare-related capital expenditures (e.g., construction and machinery); mortality costs are estimated in terms of the discounted present value of future production (wages and value of unpaid work) lost due to premature mortality; morbidity costs due to long-term (≥ 6 months) and short-term (< 6 months) disability are estimated in terms of the value of production lost to restriction of activity.

Factors affecting drug expenditures

Several key drivers of drug spending in Canada have been identified in studies by the Federal/Provincial/Territorial Working Group on Drug Prices and the Patented Medicine Prices Review Board (PMPRB), which was established

to examine pharmaceutical pricing issues in Canada^{11,12}; these are listed in Table 1. These drivers fall into two main categories, price and utilisation, and are described in more detail below.

TABLE 1 Drug Spending: selected drivers and impact

Factors affecting drug expenditures ^{1,11,12}	Impact of Drugs
Price	Health
<ul style="list-style-type: none"> • Changes in unit prices of drugs • Changes in retail & wholesale mark-ups, and fees 	<ul style="list-style-type: none"> ↑ Life expectancy ↑ Quality of life
Utilisation	Healthcare system
<ul style="list-style-type: none"> • Changes in the total population • Changes in demographics (e.g., ageing population) • Changes in health status (e.g., disease prevalence) • Changes in prescribing habits of physicians • Changes in patient compliance and drug wastage • Changes in utilisation of drugs per patient • Drug therapy instead of other treatments • Health system restructuring • Changes in drug subsidy comprehensiveness • New diseases to be treated • Old diseases to be treated or better treated • Extended patent protection, barriers to entry and reduction in competition 	<ul style="list-style-type: none"> ↓ Hospital utilisation <p>Economy</p> <ul style="list-style-type: none"> ↑ Productivity ↓ Absenteeism

Price of existing and new drugs

Newer drugs are generally more expensive than older ones¹³, and this increased price contributes to drug spending growth.¹⁴ However, to ensure that prices charged by manufacturers of patented new medicines are not excessive, Canada's PMPRB limits manufacturer price for most new patented drugs to the highest cost of therapy with existing drugs used to treat the same disease in Canada.¹⁴ For breakthrough drugs, price is limited to the median for the same drug in other industrialised countries. Price increases for existing patented medicines are limited to changes in general inflation as measured by the Consumer Price Index (CPI). Since 1993, manufacturer patented drug prices as measured by the Patented Medicine Price Index (PMPI) have declined or remained stable, while the CPI has increased every year.^{14,15} The PMPRB has been successful at restraining patented drug price increases, in some cases resulting in new medicines being priced at early 1990s prices of comparator products. This is an indication that most of the increase in pharmaceutical spending is related to greater utilisation and the introduction of new drugs.¹¹

Volume of prescriptions

Studies conducted by the PMPRB of provincial drug plans indicate that increased utilisation and new drugs are primarily responsible for recent growth in pharmaceutical expenditure.¹² Similar trends have been demonstrated for the US.¹⁶ New drugs often offer improved benefits such as better side-effect profiles or greater effectiveness, leading to patient switching to new drugs from older, less expensive drugs. Improved side-effect profiles also lower the threshold for treatment, thus expanding the population receiving prescriptions.¹³

Advances in evidence-based clinical practice guidelines also lead to greater prescribing volume. For example, the recent increase in treatment of depression has been attributed in part to the publication of treatment guidelines and awareness campaigns for the medical community and public.¹⁷ Although the prevalence of depression among US adults decreased from 10.1% in 1990 to 8.7% in 2000, the 12-month treatment rate among depressed individuals increased by 56% over this period,

from 27.9% to 43.6%.¹⁸ Furthermore, the use of pharmacotherapy among patients treated for depression increased from approximately 45% of treated patients in 1987 to 79% in 1997.¹⁷

Utilisation of drugs will increase as Canada's population ages. Estimates from the US suggest that seniors over 65 years of age use approximately 2.5 times as many drugs and spend nearly 2.5 times more on them than do those under 65.¹⁹ Since seniors are covered by all provincial and territorial drug subsidy programmes, they consume the majority (65.9% in 2000) of government drug budgets.¹

Currently, Canada prohibits prescription drug advertising except to health professionals.²⁰ Nevertheless, direct-to-consumer (DTC) advertisements for several drug products now appear in magazines and television stations, and advertisements cross the border unimpeded from the US, where DTC drug advertising is legal.²¹ A study of prescribing patterns of primary care physicians in Vancouver, British Columbia and Sacramento, California showed that patients with higher self-reported exposure to advertising requested more prescriptions for advertised drugs.²² Of patients who requested DTC advertised drugs, 86.5% received new prescriptions, compared with 26.2% of patients who did not request drugs.²² However, 74.3% of patients who requested non-advertised drugs also received new prescriptions, suggesting that the effect of DTC advertising simply takes advantage of the acquiescence of physicians to patient requests for prescriptions.²³ Furthermore, an increase in prescribing in response to consumer demand is not necessarily undesirable. Recommended treatment practices may often call for greater prescribing than seen in actual practice. Therefore, prescribing rates in the absence of advertising do not necessarily represent the appropriate benchmark.²⁴

Impact of drug therapy on health and quality of life

The WHO has defined health as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".²⁵ Life expectancy is a critical indicator of health and well-being. However, additional information on disability and quality of life is necessary to evaluate the health of a society. The

impact of medicines on some of these health indicators is described below.

Impact of medicines on life expectancy

The WHO reports that generation and use of new knowledge (e.g., access to new health technology) is responsible for approximately 40-50% of gains in life expectancy at birth and reductions in both infant and adult mortality rates in the last half of the 20th century.²⁶ A recent comparison of life expectancy and pharmaceutical consumption in 21 OECD countries found a relationship between increased spending on drugs and increased life expectancy.²⁷ This effect is not statistically significant for life expectancy at birth, but according to the analysis, the middle aged and elderly can expect to live longer as a result of increased pharmaceutical consumption. Canadian data from 1975-1998 show a high correlation (0.75 or greater) between per capita pharmaceutical expenditures and infant survival, life expectancy at birth and life expectancy at 65 years of age.²⁸ Further regression analysis suggests that increasing drug spending in all provinces to the level of the highest spending provinces would have reduced infant mortality by an average of 584 deaths per year, increased average life expectancy at birth by 8.4 months for males and 4.8 months for females, and increased average life expectancy at age 65 by 3.6 months for males and 1.2 months for females.²⁸ Furthermore, a US study found that patients who consume newer drugs have significantly lower mortality rates than those consuming older drugs, after controlling for medical condition, sex, age, education, race, income, and insurance status.²⁹

Impact of medicines on quality of life

Beyond the basic goal of decreased mortality, healthcare aims to improve health-related quality of life (HRQoL), a multidimensional measure of the physical, emotional and social aspects of disease. New pharmaceutical therapies for chronic diseases may significantly improve patient health by curbing or reversing functional deterioration. For example, a new biological response modifier for the treatment of rheumatoid arthritis has been shown to significantly improve HRQoL in terms of energy

levels, mental and physical function, and overall feeling of health.³⁰ Innovative pharmaceuticals often are more effective than existing therapy and have incremental cost-effectiveness comparable to other adopted healthcare interventions. Recently, a meta-analysis of 45 studies of 31 pharmaceutical products found a significant positive relationship ($P=0.0012$) between health-related quality of life gains and the average wholesale price of a drug.³¹ Important policy decisions need to be made in the context that cost-effectiveness does not necessarily mean cost-savings. Rather, a value judgement must be made to determine whether the benefits of medicines are worth their additional costs compared to alternative healthcare interventions.

Impact of drug therapy on productivity

The health benefits of appropriate drug therapy are accompanied by economic benefits that are often overlooked in discussions of rising drug expenditures. Disease is harmful to the economy. Canadian workers lost an average of 7.3 days of work due to illness or disability in 2002.³² Absenteeism costs a company more than the wage of the absent employee; it also forces the company to pay for replacement staff, to recruit and train other staff, and reduces the company's overall productivity. The replacement cost of a day's absence has been estimated at 1.75 times the daily wage.³³ Fringe benefits such as insurance and pension benefits also need to be considered; these add 13.9% onto wages.³⁴ Assuming a five-day work week, multiplying these values by Canadian average weekly earnings of \$691.38,³⁵ absenteeism due to illness and disability costs an estimated \$2012 per worker annually ($\$691.38 \div 5 \times 7.3 \times 1.75 \times 1.139 = \2012.02).

Example of depression

The economic benefit of drugs on productivity can be clearly seen in a specific example, major depressive disorder. Worldwide, depression is the leading cause of years lived with a disability, and ranks fourth among causes of disability-adjusted life years (years of life lost due to disability and premature mortality).³⁶ Depression is second only to hypertension as the chronic condition most commonly encountered in general medical practice.³⁷ Up to 8.6% of Canadian adults meet the criteria for a diagnosis of depression at some time in their lives,³⁸ and 4.5% of Canadians age 15

years and older suffered from the disorder in 2002.³⁹ An analysis of US survey data revealed that among workers with at least one day absent from work, those with depression experience almost twice as many days of absenteeism as do those without depression (7.6 vs. 4.7 days in a 30-day period, $P < .05$).⁴⁰ In addition, a hidden cost in the workplace is “presenteeism”, where people are physically at work, but too ill or tired to function to their full potential. A recent US study found that workers with depression reported an average of 5.6 hours/week in lost productivity compared to an expected 1.5 hours/week.⁴¹ An alarming 81% of the productivity time lost by depressed workers was due to reduced performance while at work. In 1998, depressed Canadians made an estimated 2.38 million visits to psychologists and social workers, and lost over 115,000 person-years of work to the disorder, at an estimated cost of \$1.42 billion.⁴²

Appropriate pharmacotherapy is key to reducing the societal and economic burden of depression.⁴³ A cost-benefit analysis of drug coverage in the US calculated that providing drug treatment effective in reducing depression would result in net savings of US\$822 per depressed worker by avoiding lost work days.⁴⁴ Furthermore, if full patient adherence to drug therapy for depression could be attained, an additional US\$1099 would be saved.⁴⁴ An analysis has shown that newer medications are significantly more effective at reducing lost work days than are older drugs,²⁹ suggesting that these trends are only likely to strengthen in the future as new drug therapies are developed. In addition to the above US studies, an unpublished analysis of Canadian claims data⁴⁵ reveals that the average annual cost of therapy for Effexor IR and XR (venlafaxine), the current top ranked antidepressant based on new prescriptions⁴⁶ was \$255 per patient in 2002, which is less than the cost to employers of one day of missed work.

Even if full compliance with treatment regimens were achieved, and all patients required chronic treatment (an unrealistic assumption), the annual cost of therapy with Effexor IR and XR would increase only to \$739 per patient, less than the cost of three days of missed work. Clearly, treating a patient to

remission with effective antidepressant therapy represents a valuable investment.

Impact of drug therapy on the healthcare system - *Hospital utilisation and drug expenditures*

Hospital discharges have decreased in Canada as pharmaceutical expenditures have risen. There were 2.9 million hospital discharges in 2000/01, a 2.0% decrease from the previous year and a 10.7% decrease from 1995/96.⁴⁷ The age-standardised discharge rate has also declined steeply, to 9,138 discharges per 100,000 people in 2000/01, a 3.5% decrease from the previous year and a 16.5% decrease from 1995/96.⁴⁷ From 1985 to 2002, the share of overall healthcare spending claimed by hospital expenditures decreased from 40.8% to 31.3%, while that for drug expenditures increased from 9.5% to 16.2% (Figure 1).¹ Shifting costs from hospitals to alternative outpatient care including cost-effective drug therapies is potentially one avenue to sustain Canada's healthcare system, especially since per capita annual spending on hospitals currently rests at \$1,119.23, compared to \$577.35 for prescription and OTC drugs.⁵ For example, between 1990 and 2000 the average annual cost per patient of drug therapy for depression in the US more than tripled from US\$385 to US\$1,319.¹⁸ Over the same period, however, annual expenditures per patient for inpatient treatment for depression decreased by more than half, from US\$2,738 to US\$1,127. As a result of this shift from inpatient care to outpatient disease management and drug therapy, the total medical cost per treated patient with depression decreased by 19% from \$4,072 in 1990 to \$3,309 in 2000.¹⁸

Although there are no estimates of how much of Canada's decreased hospitalisation is attributable to the greater utilisation of drugs, an analysis of US data suggests that for every \$1 increase in pharmaceutical expenditure, hospital care expenditure is reduced by \$3.65.⁴⁸ Pharmaceutical innovation is likely to drive even greater decreases in hospitalisation in the future. A US study estimated that using drugs with an average age since introduction to market of 5.5 years instead of 15 years would increase per capita prescription drug expenditure by US\$18 annually, but reduce hospital expenditure by US\$56 and all types of nondrug medical spending by US\$71.²⁹

Medicine coverage policies and healthcare utilisation

Prescription drug coverage policies strongly influence access to pharmaceuticals. Restrictive coverage policies may seem attractive because they result in decreased short-term spending on drugs through decreased utilisation. However, they may have unintended negative consequences, not only on patient health but also on overall healthcare spending. In the 17 months following introduction of cost sharing in Quebec in 1996, use of prescription drugs decreased significantly among the elderly and welfare recipients.⁴⁹ Reduced use of medicines that prevent health deterioration or prolong life led to steep increases in the rate of emergency department visits per 10,000 person-months, from 32.9 before the policy was introduced to 47.1 afterwards among the elderly, and from 69.6 to 123.8 among welfare recipients.⁴⁹

Although the motive of cost-sharing initiatives is to discourage unnecessary demand for prescriptions, in practice they have been inefficient blunt instruments. Cost-sharing has resulted in reductions in the use of essential as well as non-essential medications⁵⁰⁻⁵², with the predictable consequence of increasing hospital and nursing home admissions.^{53,54} Most policy discussions about appropriate use of clinically effective treatments stress cost savings from reducing unnecessary care and overuse of services. However, it is equally important to address the underuse of many evidence-based treatments. Recently published US research found that prescription medicines were underused in the treatment of seven out of nine medical conditions examined: asthma, cerebrovascular disease, congestive heart failure, diabetes, high cholesterol, hip fracture and high blood pressure.⁵⁵

Inappropriate drug utilisation

Appropriate prescribing and adherence to therapeutic regimens are critical to cost-effective drug utilisation. The consequences of inappropriate drug use (i.e. inappropriate prescribing, medication errors and non-compliance) include unnecessary illness, disability and death, delayed recovery, increased severity of illness, need for more intensive treatments, and increased hospitalization.

Inappropriate prescribing is estimated to cause at least 1.1% to 3.1% of hospitalizations, and between 1.1% and 4% of physician visits.⁵⁶ The annual direct medical cost of preventable drug related morbidity among Canadian seniors is estimated to be nearly \$11 billion.⁵⁷

The World Health Organization (WHO) reports that in developed countries, adherence to therapy among patients with chronic diseases is only 50%.⁵⁸ Poor adherence is one of the primary reasons for not achieving the full benefits of drugs; it also increases the likelihood of drug resistance and wastes healthcare resources. Most interventions that enhance adherence are cost-saving, by increasing successful outcomes and reducing disease complications that require more costly interventions, such as hospitalisation.⁵⁸

CONCLUSION

Viewing drug spending in isolation from other healthcare expenditures has been rightly criticised as a “silo mentality”.⁵⁹ Focussing on short-term drug budgets rather than wider public health goals is particularly illogical when healthcare systems are publicly based, as in Canada.⁶⁰ Drugs, and the development of new drugs, are vital components of an effective and sustainable healthcare system. Between 1960 and 1990, approximately half of the gains in life expectancy at birth and decreased mortality rate were attributable to gains in education and income, with the other half accounted for by generation and use of new technology, including drugs and vaccines.²⁶ Although newer drugs are typically more expensive than older drugs, they significantly reduce mortality, hospitalisation, lost productivity, and nondrug medical spending.²⁹

Clinical and economic effectiveness together determine whether or not drug spending represents good value for money. Assessing the value of medicines hinges on the costs associated with access and quality. Making informed assessments is challenging, requiring a comprehensive and thoughtful policy perspective that takes a broad view of the role of medicines in the healthcare system and society at large.^{59,60} Indeed, rising drug spending may be welcome if we take into account that it continues to cure and control disease, to replace invasive procedures, to avoid hospitalisation and to maintain workplace

productivity.⁶¹ Optimal patient outcomes require focusing on promotion of appropriate prescribing and improvement of adherence to effective therapy, rather than reducing access to beneficial drugs.

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